LIBRARY
OF THE
UNIVERSITY
OF ILLINOIS
617.606
IL
1873

1859

LIBRARY

OF THE

Chicago College of Pharmacy

FOR REFERENCE ONLY
AND MUST NOT BE TAKEN OUT OF THE ROOM.

No.

PICTORIAL PRINTING CO. CHICAGO, ILL.

THE ANNUAL JOURNAL

OF THE

ILLINOIS

State Dental Society

AND

JOINT DISCUSSIONS

OF THE

Illinois and Iowa State Dental Societies.

"ARTEM DOCTRINA SANITATEM ARTE."

CHICAGO:
WABASH STEAM PRINTING HOUSE, COR. WABASH AVE. & 12TH STREET.
1873.

617.606
IL
1873

Illinois State Dental Society.

ORGANIZED JULY 24, 1865.

OFFICERS, 1872-73.

PRESIDENT.....J. N. CROUSE, Chicago.
VICE-PRESIDENT.....S. L. EDWARDS, Peoria.
SECRETARY.....C. R. E. KOCH, Chicago.
TREASURER.....S. M. STURGISS, Quincy.
LIBRARIAN.....J. M. HURTT, Peoria.

EXECUTIVE COMMITTEE.

O. WILLSON, Aurora. W. T. MAGILL, Rock Island. G. V. BLACK, Jacksonville.
A. E. MATTESON, Kewanee. J. A. W. DAVIS, Mason City.

OFFICERS, 1873-74.

PRESIDENT.....C. STODDARD SMITH, Springfield.
VICE-PRESIDENT.....E. HONSINGER, Chicago.
SECRETARY.....C. R. E. KOCH, Chicago.
TREASURER.....S. M. STURGISS, Quincy.
LIBRARIAN.....R. MATTHEWS, Pontiac.

EXECUTIVE COMMITTEE.

G. V. BLACK, Jacksonville. G. S. MILES, Jerseyville. C. HENRY, Jacksonville.
M. S. DEAN, Chicago. T. L. GILMER, Waverley.

NEXT MEETING WILL BE HELD AT JACKSONVILLE, ON THE SECOND TUESDAY IN MAY, 1874.

A CORDIAL INVITATION IS EXTENDED TO EVERY PROGRESSIVE DENTIST IN THIS AND ADJOINING STATES TO BE PRESENT.

278678

MINUTES OF TRANSACTIONS

OF THE

Illinois State Dental Society.

NINTH ANNUAL SESSION.

BY C. R. E. KOCH, SECRETARY.

ROCK ISLAND, May 13, 1873.

The ILLINOIS STATE DENTAL SOCIETY convened for its Ninth Annual Session at Negus' Hall, and was called to order by the President, Dr. J. N. CROUSE, at 10 o'clock A. M.

Upon motion, the reading of the minutes of the last annual session was dispensed with.

The following named members were present:—G. V. Black, Jacksonville; J. B. Bell, Chicago; G. H. Cushing, Chicago; J. N. Crouse, Chicago; M. S. Dean, Chicago; W. C. Dyer, Chicago; N. E. Babcock, Rockford; E. B. Call, Peoria; Warren De Crow, Quincy; K. B. Davis, Petersburg; C. R. Dwight, Danville; F. W. Dean, Pekin; W. W. Dean, Lacon; E. F. Davis, Galesburg; I. A. Freeman, Chicago; D. B. Freeman, Chicago; E. Honsinger, Chicago; M. F. Hand, Joliet; E. E. House, Rockford; C. A. Kitchen, Galva; A. W. Harlan, Chicago; C. R. E. Koch, Chicago; J. E. Lowe, Chicago; J. S. Marsh, Chicago; G. S. Miles, Jerseyville; A. E. Matteson, Kewanee; J. L. Marriner, Ottawa; C. T. Matteson, Macomb; W. S. Richey, Elm-

wood; W. T. Smith, Peoria; E. C. Stone, Galesburg; C. Stoddard Smith, Springfield; S. M. Sturgiss, Quincy; E. D. Swain, Chicago; O. Willson, Aurora; R. C. Dawkins, Decatur; S. L. Edwards, Peoria; A. E. Gibbs, Ottawa; C. W. Greenleaf, Peoria; T. L. Gilmer, Waverly; G. O. Howard, Galena; N. C. Hunting, Lincoln; G. H. Harrington, Delavan; E. H. Kilbourne, Aurora; G. P. Kingsley, Freeport; C. F. Konantz, Quincy; A. M. Kelsey, La Salle; J. M. Lionberger, Dallas City; H. N. Lewis, Quincy; R. Matthews, Pontiac; W. T. Magill, Rock Island; W. H. Mills, Freeport; W. W. Ormsbee, Geneva; W. P. Richards, Elgin; A. C. Schadle, Warren; E. H. Stewart, Joliet; H. H. Townsend, Pontiac; J. F. Thompson, Chicago; S. C. Wilson, Bloomington.

Upon motion of Dr. Swain, a short recess was then taken for the payment of dues.

REPORTS OF COMMITTEES

being declared next in order,

The Committee on the Rubber Question was called upon and stated, by its Chairman, that nothing further was to be reported, as the present state of the matter was probably thoroughly understood by all the members present.

The report was, upon motion of Dr. S. C. Wilson, accepted, and committee continued.

The Committee on Dental Legislation submitted the following report:

Your Committee on Dental Legislation beg leave to report that the bill for the better professional education of the Dental profession has passed the House of Representatives, and has been favorably reported on by the Senate Committee, to which it was referred, and has been ordered to a second reading. Owing, however, to the pressure of other business, your committee were unable to secure any further action by the Senate, before the adjournment of the Legislature. As that body will meet in adjourned

session in January next, when the matter will be taken up at the point at which it now rests, the committee have strong hopes of securing its passage at that time.

G. H. CUSHING,
C. S. SMITH,
A. W. FRENCH, } *Committee.*

This report was, upon motion, accepted, and after substituting Dr. G. S. MILES for Dr. A. W. FRENCH, as one of the members of the committee, it was continued.

The Committee on Infraction of the Code of Ethics stated, through its chairman, that no report was required from them, as no new cases had been presented before them since the last session.

REPORT OF PUBLICATION COMMITTEE.

Your Committee on Publication beg leave to report that they have had printed 750 copies of the Transactions of the last Annual Session of the Society, which have been distributed to the dentists of this and adjoining States, and at the meeting of the American Dental Association.

Copies also have been forwarded to all the Dental Colleges, journals and societies, and to other scientific bodies of this country and of Europe.

In reference to the distribution of copies in this State, your committee would report that they have sent them to every dentist of the State whose name could be ascertained, from the list of the Rubber Company, and the records of this society. Copies were sent to those who had ceased to be members, in the hope that by showing to them the work this body was now doing, they might be awakened and led to a renewal of their relations with us; in doing this, your committee was fully aware that it afforded to these "backsliders" the same advantages enjoyed by members in good standing, and without any exertion or expense to them; and your committee would respectfully suggest the propriety of

an expression of the sense of the society upon this point, as a guide to future publication committees.

From the accompanying voucher, it will be seen that the expense of printing was $220, an amount, though smaller in the aggregate than that paid the previous year, is still somewhat larger in proportion, the present volume being smaller, yet it was the lowest bid received.

The expense of distribution, correspondence, &c., was $30.50, making a total expended of $250.50.

Your committee are happy to report that they have realized from advertisements in the present volume, in cash or its equivalent, $105, and from sales of extra copies $6.00—making in all $111, reducing the actual cost to the society to $139.50.

There are still in possession of the committee, goods to the amount of $15.00 unsold, which it is hoped the members will readily convert into money, as the great portion of the goods so received has been consumed and paid for by two members.

Your committee would further report having collected $10.00 from the Philadelphia Dental College, and a like amount from the Baltimore Dental College, for advertisements in previous issues of the Transactions, reported as unpaid in the report of last year's publication committee.

ILLINOIS STATE DENTAL SOCIETY TO PUBLICATION COMMITTEE.

Dr. Aug. 31, 1872—To Printing Transactions, as per bill	$220 00	
To Postage, Wrappers, Expressage, &c., on Transactions	28 50	
To Stationery and Postage on Correspondence	2 00	
To Goods unsold	15 00	
To cash returned to Treasury	90 50	
	$356 00	

Cr. By Cash from Treasury	225	00
" from Advertising in Transactions of 1870–1	20	00
" " " 1872	105	00
" from Sales of Extra Copies	6	00
	$356	00

All of which is respectfully submitted.

CHARLES R. E. KOCH, } *Committee on Publication.*
S. M. STURGISS, }

Upon motion, this report was accepted.

Dr. M. S. Dean moved that a vote of thanks be tendered the Publication Committee, for the expeditious and able manner in which their work had been executed. Carried.

TREASURER'S REPORT.

Dr. S. M. Sturgiss, Treasurer, submitted the following report:

May 16, 1873—Received from former Treasurer	$315	75
" from Dues	22	00
" from Donation	2	00
" from Interest	1	10
" from Publication Committee on Advertisements	80	00
" from Publication Committee on Advertisements	10	50
" from Mr. Bingham, return on over-payment of account	5	40
	$436	75

May 16, 1873—Paid, by order, to Dr. Kingsley			$6 50
"	"	Rent of Hall	36 00
"	"	Janitor	5 00
"	"	Mr. Bingham	20 00
"	"	Dr. Crouse, Circulars	6 00
"	"	Dr. Koch, Secretary	25 00
"	"	Chairman Pub. Com.	225 00
"	"	Secretary, for volume of Records, &c.	4 75
"	"	for Postage	1 20
Balance on hand			107 30
			$436 75

There have also been turned over to me by the Publishing Committee, some $15.00 worth of goods, received on advertising account, and undisposed of by them.

S. M. STURGISS, *Treasurer.*

This report, upon motion, was accepted, and subsequently approved.

SECRETARY'S REPORT.

Your Secretary respectfully submits the following report:

One year ago there appeared upon the roll of active members of this society, 117 names, of whom 38 had been dropped from various causes, mostly for non-payment of dues, leaving the number of members in good standing, 79.

Thirty-one new members were elected at the last annual meeting, of which one, Dr. Brophy, of Chicago, has failed to qualify, leaving the gain by new members 30—increasing the membership to 109.

Since then there have been dropped from the roll on account of death, Dr. J. W. Hendel, of Peoria (1); on account of removal to other States, Drs. F. A. Burnham, of Rochelle, R. D. Mowbray, of Warsaw, and G. W. Rivers, of Pittsfield (3); and for non-payment of dues, Drs. C. O. Dean, Mount Carroll, T. D. Laughlin, of

Springfield, J. P. Foltz, of Amboy, G. W. Brown, of Fulton, and J. W. Grey, of Normal (5);—making a total loss of 9, which leaves the number of active members in good standing at this date, 100.

The list of honorary members embraces 19 names, four of which have been added during the year.

The correspondence of the society has been limited to the transmission of your resolutions of condolence in the case of the late J. W. Hendel, D.D.S., of Peoria, to his widow, the furnishing of certificates to nine members as delegates to the American Dental Association, and a letter to Dr. C. W. Greenleaf, of Peoria, agreeably to the action of this society, a copy of which is preserved.

CHARLES R. E. KOCH, *Secretary.*

Upon motion, this report was accepted and approved.

REPORT OF EXECUTIVE COMMITTEE.

The Executive Committee reported, by its Chairman, Dr. O. WILLSON, that a formal reception would be tendered this society by the people of Davenport and the Iowa State Dental Society, and that President Crouse would be expected to respond to the addresses to be delivered by his Honor, the Mayor of Davenport, and the President of the Iowa State Dental Society.

They further report having had 700 circulars printed, at an expense of $28 for printing, and $13 for distribution.

The plan for the joint session with the Iowa Society is to share the expenses equally between the two societies.

This report, upon motion, was accepted and adopted.

ELECTION OF MEMBERS.

The Executive Committee reported having examined the following named applicants for membership, and recommended their election: Chas. F. Dyer, Sterling; E. B. David, New Windsor;

R. H. Antes, Geneseo; H. L. Woodburn, Oregon. They were all duly elected.

Dr. O. Willson then stated that the Executive Committee would be in session at 7:30 o'clock, A. M., each day, at the parlors of the Harper House, for the examination of candidates for membership.

Dr. Magill informed the society that the Ferry Company had agreed to transfer the members free of charge to and from the joint sessions at Davenport, if they moved as a body.

Dr. Dean, of Chicago, moved a suspension of the order of business, and to request the President to deliver his annual address now. Carried.

THE ANNUAL ADDRESS

WAS THEN DELIVERED BY PRESIDENT CROUSE.

Gentlemen of the Illinois State Dental Society, if any of you entertain fears of being bored with a long address, dismiss them. A long address, when we are all impatient for the feast of fat things in store for us—the combined talent of the two representative States of the West—would be in as bad taste as a long grace said at a meal set for a party of famishing hunters.

It is hard to find words that will express my gratification and pleasure at meeting with such numbers and intelligence as to-day represent the Illinois State Dental Society.

Those of us who were present in Chicago when this sturdy child of eight years was born, and who witnessed its struggles for life for the next two or three years, I am sure, will see to-day only promise for its future.

In numbers it has increased in more than a ten-fold ratio during its brief existence, until to-day it ranks favorably, if not first of any dental society in the world. But its history is only the history of our profession repeated.

We are told that dentistry is to be classed among the lost arts. If so, it has been among the last of those recovered, for we have

no satisfactory proof of its being pursued as a separate branch of medicine until a recent date. But it has made rapid strides.

Dental colleges and journals were things unheard of at the commencement of the nineteenth century, and dental practitioners were few in number.

Taking a step still farther back, we find that our profession is but the history of all others repeated, except that it has caught the spirit of the age in which we live, and its growth has been more rapid—that, in fact, the whole history of man is one record of progress.

In the vegetable and animal world there is constant change, but not progress. Not so with man. One generation lays the foundation upon which the next may build. As society improves, its claims become greater. Inventions and discoveries which would be lost upon one generation are indispensable to the next.

The laboratory, and practical dissection, would have been little prized in an age when surgery was represented by barbers; and the science of histology and microscopy about as much valued by the early practitioner in our specialty, as a set of artificial teeth would now be by the Cardiff Giant. But where are the intelligent men in any branch of medicine that would be willing to compete to-day with their fellow-laborers without these aids? The microscope and test tube have placed the medical profession upon a scientific basis, and nearly every advance in the science of disease, health and life itself are due to modern improvements and facilities.

It is not in the early history of society that men devote their time and energies to classifying laws, inventing machinery, building railroads, tunneling mountains, rivers and lakes. These are born of necessity and enterprise.

When we think for a moment of the rapidity with which our profession has increased in numbers during the last thirty-five or forty years, we are led to ask how has it kept pace with the different professions in other respects?

Its recognition by Harvard as one of the learned professions, and its connection with this time-honored institution, is prophetic

and exceedingly gratifying. Nearer home, we have the St. Louis Dental College in connection with one of the leading medical colleges of this country. We believe the time is coming speedily, when all of our leading literary and medical colleges will consider our special branch of science not only worthy of recognition but valuable as an ally. A mighty work is before us, to enable us to hold the position already gained, and to make the advances which science demands at our hands. At present, we must confess that we have too few scientific men in proportion to our number. Not that we are lacking in talent or ability, but the talents of many men who might rank first among scientific men, have been almost exclusively devoted to manipulation.

Men who devote themselves solely to manipulation may become experts, but they will in reality know nothing of the science of their profession. It is those who dive deep into truth for truth's sake who are the leaders and benefactors of any profession.

Probably there was never a time in the world's history when the love of money so completely controlled and influenced all trades, all professions, all individuals, as at the present. There is danger of sacrificing our profession to this. The general feeling is, how can we make the most money out of our practice? For this we labor, giving too much of our time to actual practice, and too little to study.

The great need of our profession is scientific men, and more men of culture. To command the position we desire, we must have them. The rank of any profession does not depend upon the number who have an elementary knowledge of it, but upon the high-water mark of its educated minds. We should bear in mind, in selecting students, that we are forming the dental profession of the future, and choose young men who will honor and advance it.

I would not discourage for a moment legislation to protect ourselves and the public from imposition; but this, of itself, will never free us from quackery. At present, the demand for dental services is much greater than can be supplied by those fit to be called practitioners; hence, the amount of crude material we have

to compete with. Then, there are so many grades among those who are recognized as qualified practitioners, that the public find it hard to discriminate between fairness and dishonesty, competency and incompetency. In other words, to determine when they are in safe hands. But the public is fast being educated. Let us help on the good work by putting such a wide difference between qualified practitioners and empirics that none need be deceived. To do this requires earnest individual effort and application. It requires time also. Shall we wait until we have attained a competency before we devote a portion of our time to scientific study? Would it not be wiser to take a portion of each day from our practice or leisure for it? I said scientific study, not that I would disparage all other. On the contrary, I believe that we should aim at broad culture instead of allowing ourselves to become one-idea men.

The great class of intelligent people with which we are brought in contact in our practice, demand that we shall be something more than skillful mechanics if we would retain their confidence and respect. Make a trade of a profession, however noble the profession, and you have a *trade* of the lowest order. A large number of books is not necessary, great facilities are not needed. The means are within the reach of us all. Too many books many times discourage rather than stimulate study. We must also be content, if we would make rapid progress, to accept at the outset the results of other men's labor, instead of wasting valuable time in discovering for ourselves established facts. For instance, much time that is needed in other directions is wasted by would-be microscopists in seeking for truths already established. I fancy it was this class of men referred to by the one who said, "in America every one gets a mouthful of education, but scarcely any one a full meal." This reminds me that I am delaying the rich banquet that we are to enjoy this afternoon, and I will not longer keep a hungry crowd in waiting. And, judging from the long bill of fare we have before us—twenty-one courses—and the skillful culinary artists whose names are appended to different dishes, each one will be furnished with not only a mouthful but a belly-full.

AMENDMENTS.

Upon motion of Dr. CUSHING, the society then proceeded to the consideration of the various amendments to the By-Laws proposed at the last annual session.

The following amendment, proposed by Dr. S. C. WILSON, was adopted:—" Section 3, Article 1, after the words 'and letters testimonial,' insert 'and shall receive all monies due the society from its members, and pay the same to the Treasurer.' "

The amendment proposed by Dr. CUSHING, to change the annual dues, now fixed at $2.00, to $4.00, was next considered, and lost, after discussion and division of the house.

The amendment proposed by Dr. KOCH, to establish the annual dues annually, was then considered, and lost, after discussion.

Dr. MARSH then moved a reconsideration of the vote on Dr. Cushing's amendment, which was seconded and carried, and after further discussion, the amendment to change the annual dues now fixed in Article 4 of the By-Laws at $2.00, to $4.00, was adopted by a vote of 33 to 12.

The amendments proposed by Drs. EDWARDS and KENNICOTT, in reference to the time of taking students, were next taken up, and it was moved to first consider that offered by Dr. Kennicott, which is as follows:—Insert as Section 1, Article 5—

" DUTIES AND PRIVILEGES OF MEMBERS.

" SECTION 1. An active member shall not accept a student for a less period than three years, and shall require each student to give a written obligation to graduate at some regularly organized Dental College, before he assumes the responsibilities of a dental practitioner."

It being understood that the term of pupilage should be three years, but not necessarily with the same preceptor, this amendment was adopted.

Dr. HONSINGER proposed the following amendment to Article 4

of the By-Laws—"that the annual dues, now fixed therein at $4, be changed so as to read $3."

[This has to lie over until the next annual meeting.]

Society then adjourned to meet at 3 o'clock P. M., at Davenport, in joint session with the Iowa State Dental Society.

SECOND DAY.—(CALLED SESSION.)

The society was called to order at 12 o'clock, M., by President CROUSE.

Upon motion, the reading of the minutes was dispensed with.

ELECTION OF MEMBERS.

The Executive Committee reported favorably upon the names of A. E. Kennedy, of Morrison; A. H. Shibley, of St. Charles; J. W. Starks, Rock Island; J. W. Huckstep, Jacksonville, for membership, they were duly elected.

REPORT OF EXECUTIVE COMMITTEE.

Dr. O. WILLSON, Chairman of the Executive Committee, submitted the following:

DAVENPORT, May 15, 1873.

The Executive Committees of the Illinois and Iowa State Dental Societies, met at the office of Dr. Kulp, Davenport, for the transaction of business.

Dr. O. WILLSON was elected Chairman, and Dr. E. T. RIGBY, Secretary.

The following was then adopted:

Resolved, That the contingent and hall expenses incurred by the union meetings of the two societies be shared equally between them, expenses for the individual meetings of the same not included.

Resolved, That the expenses of the publication of the Transactions of the Societies shall be shared equally between them, each paying one half.

The Iowa Society further agrees to pay the sum of $25.00 of the expense of superintending and editing the proceedings of the two societies.

Resolved, That the proceedings of the joint meetings of the Illinois and Iowa State Societies be published under the following title :—" Transactions of the Illinois and Iowa State Dental Societies, held at Rock Island, Illinois, and Davenport, Iowa, May, 1873."

The following is an estimate of the above mentioned expenses :

Hall in Rock Island	$10 00
" Davenport	20 00
Moving Chairs	5 00
Reporting and Editing Transactions	50 00
One Thousand copies Transactions	400 00
Total	$485 00

O. WILLSON, *Chairman.* EUGENE T. RIGBY, *Secretary.*

This report was accepted and adopted.

Society then adjourned, subject to the call of Executive Committee.

THIRD DAY.—(CALLED SESSION,)

Meeting called to order at 8 o'clock, A.M. President CROUSE in the chair.

Minutes of previous sessions were read and approved.

ELECTION OF MEMBERS.

The Executive Committee then reported favorably upon the

names of Drs. A. S. Chapman, Princeton; G. S. Hobert, Ottawa; E. V. H. Alexander, M.D., Sterling, for membership. They were duly elected.

Society adjourned.

FOURTH DAY.

Meeting was called to order by President CROUSE at 2 o'clock P. M.

Minutes were read and approved.

The charges against Dr. Greenleaf being called up, were dismissed, upon the satisfactory showing of his regret at what had occurred, and his pledge to abide by the Code of Ethics in the future.

ELECTION OF OFFICERS.

It was then agreed to proceed to the election of officers, which resulted as follows:

President—C. Stoddard Smith, Springfield.
Vice-President—E. Honsinger, Chicago.
Secretary—C. R. E. Koch, Chicago.
Treasurer—S. M. Sturgiss, Quincy.
Librarian—R. Matthews, Pontiac.
Executive Committee—G. V. Black, Jacksonville; G. S. Miles, Jerseyville; Chas. Henry, Jacksonville; M. S. Dean, Chicago; T. L. Gilmer, Waverly.

Jacksonville was chosen as the next place of annual meeting.

MISCELLANEOUS.

The following resolution was offered by Dr. Swain, of Chicago:

"RESOLVED—That hereafter, when charges are made against any member of the society, they shall be made in writing, with

specifications setting forth clearly each violation of the code of ethics governing this body."

Carried.

It was moved and carried that an order be drawn on the treasurer for $25.00, in favor of the secretary, for reporting.

Dr. STURGISS offered the following, which was adopted:

"RESOLVED—That the thanks of the Illinois State Dental Society are hereby tendered to the Iowa State Dental Society, for their untiring efforts to make our stay pleasant while sojourning with them."

The newly-elected President, Dr. C. Stoddard Smith, was then escorted to the chair, and made some brief remarks in acknowledgment of the honor conferred.

Dr. L. C. Ingersoll, of Keokuk, Iowa, was elected an honorary member, and the secretary instructed to transmit to Dr. Ingersoll the certificate of membership of this society, by special messenger.

The Executive Committee then reported having examined the Treasurer's accounts, and that they had found them correct.

Report was accepted and adopted.

Upon motion, the President and Secretary were authorized to issue certificates to delegates to the American Dental Association.

President Smith was requested to deliver the annual address next year at Jacksonville.

Dr. M. S. DEAN offered the following, which was adopted:

"WHEREAS, the members of the Illinois State Dental Society are greatly indebted to the proprietors of the Harper House, and especially Mr. Moulton, the gentlemanly and efficient manager, for the superior accommodations and most excellent fare which

they have received during their stay in this city; therefore, be it

"RESOLVED—That the thanks and kind wishes of this Society be and are hereby cordially tendered to these gentlemen, for the liberal and courteous treatment received at their hands."

The Secretary and Treasurer were constituted a Publication Committee, with power to condense and revise.

Society then adjourned to meet at Jacksonville, on the second Tuesday in May, 1874, at 10 o'clock A.M.

Transactions of the Joint Meetings

OF THE

ILLINOIS & IOWA

State Dental Societies,

HELD AT

ROCK ISLAND, ILL., AND DAVENPORT, IOWA.

MAY, 1873.

Transactions of Joint Sessions.

REPORTED BY C. R. E. KOCH, OF CHICAGO.

MINUTES.

MOORE'S HALL, DAVENPORT, IOWA, May 30, 1873.

The joint session of the Illinois and Iowa State Dental Societies was called to order at 3 o'clock P. M. by President Ingersoll, of the Iowa Society, after which his Honor Mayor Murphy, of Davenport, delivered the following address:

Gentlemen of the Illinois and Iowa State Dental Associations:

As Mayor of the city of Davenport, I am requested to extend to you the privileges and hospitalities of our city, and at the same time, in behalf of the good people of the city of Davenport, to extend to you the right hand of welcome, and in a cordial manner to say to you that we feel honored by your presence. We hope your visit will be both pleasant and profitable, and any assistance we can render you will be freely extended. It will be our pride to so conduct ourselves towards you that when you return to your homes and firesides, each can say in sincerity and truth, "I am

glad I paid a visit to the beautiful city of Davenport." We desire to become acquainted with you. We want to know you, and we want you to know us, for we are satisfied that in that acquaintance, we shall receive benefit.

It is but meet that I should state on this occasion that the State Dental Societies of Illinois and Iowa, prompted by a refined feeling of fraternity and cordiality, have so arranged by previous understanding, that they can clasp hands, not across the bloody chasm, but across the Mississippi river, and in a spirit of kind union hold a joint convention for the advancement of their profession, and the individual benefit of their members. Gentlemen, permit me to congratulate you on this happy union, and to say in conclusion that I am satisfied it will be productive of good results.

President INGERSOLL responded as follows:

Mr. Mayor and Gentlemen, of the City of Davenport:

On behalf of the Iowa State Dental Society convened in your goodly city for their annual meeting, I thank you for the cordial reception which you have been pleased to give us, and especially for the assurances we have of the public interest in the advancement of dental science, indicated by the presence of the honored representative of the city, and by so goodly a number of citizens, among whom are many professional men, who, though specially interested in other departments of useful skill and science, can join us in the common interest we have in laboring for the welfare of mankind.

Gentlemen of the Illinois State Dental Society:

It is my pleasant privilege, as President of the Iowa State Dental Society, and representative of the individual feelings of all its members, to welcome you to our presence and company. We reach out from our hearts the hand of fraternal feeling and fellowship, and welcome you to our Iowa shore. The broad and mighty Mississippi which you have crossed to meet us here, divides the

area of our Society operations and influence, but does not divide us in sympathy. Being, therefore, one in heart and one in aim, we have invited you, as friends and co-workers, to a "*basket dinner*," where each shall contribute out of his own little store, to make a feast of the highest relish.

It shall not be of the grosser sort that ministers to the wants of craving stomachs. It shall not be of bitter herbs and wine that cloud the intellect and glaze the eye; it shall be *food* for the intellect—a feast of reason, a flow of soul and of science. For toasts, we shall have facts, not fancies; for wine we will have wit. So will we drink to our professional health. * * *

We are here in our corporate capacity. Individualism of home and the office is merged in the professional body. "*E Pluribus Unum*" is a motto as significant in its application to us to-day as to the harmonious union of the several States of our great nation. We are indeed *one* from many.

As I look now upon the faces of this intelligent body of men, convened in the interest of science and of a noble profession, already taking rank among the learned professions of our time, a wonder steals over me exciting a strange surprise.

It is within the memory of some who are here that Indians sat in council on the very ground we now occupy. Rudely clad, their heads fantastically crowned, their bodies belted with savage implements, they met to discuss the ferocities of fiendish war. Look on that assembly and then on this. How marvelous the change from our boyhood to our manhood days!

Certainly, gentlemen, we do not meet to-day in the woods, but in a beautiful city of elegant and refined homes, of business thrift and commercial importance, where schools and colleges and churches declare the intellectual and moral culture of the people. We are among a people who foster science and dental skill, and who will look upon the joint assembly of these two Societies as no unmeaning event.

Here we may give a higher dignity to the calling of a dentist. Here we may stamp with new honor the professional name.

Here we may contribute our mite to dental literature, and add our individual experiences to the aggregate experience of the profession, and deduce therefrom a more successful practice and gain some steps of advancement toward the acme of scientific acquirements and professional skill.

Again I bid you welcome—and with confidence I can trust to the deliberation and action of this combined assembly the good name and the best interests of the profession which you have chosen, and which you will delight to serve and honor.

The President of the Illinois Society having been accidentally detained upon the other side of the river, Dr. O. WILLSON, of Aurora, made the following impromptu reply to these addresses:

In the absence of the proper person to respond on this occasion, I wish the honor had been tendered one able to do *justice* to the happy sentiments just offered by the gentlemen representing so enviable a constituency. But, sirs, as Chairman of its Executive Committee, and in behalf of the Illinois State Dental Society, permit me to say that we highly appreciate the suggestions, and *feel*, though time may not now be taken to utter it, their bearing upon the motives that have drawn us together, in this *spot*, upon the "Father of Waters," with its associations, as well as those of the State, the contrasts and phases of the then, now, and the to be of history.

Briefly allow us to sincerely thank you, Mr. Mayor and citizens of beautiful Davenport, for this *very* cordial reception, hoping that our record as citizen guests while among you may meet your hearty approval, and that as practitioners we may add honor to the name of the dental profession.

To the Iowa Society, let me say, that by a "slip of the tongue" our President, in suggesting this morning that we cross the ferry to this point in a body, said we had better come *with* the body. I think, sir, if *he* has come, it must be *without* the body; and *I* am somewhat in the condition of the man who went to town in his lumber wagon drawn by a yoke of oxen, and returning, having

imbibed somewhat freely of the ardent—as General Logan relates it—fell asleep in the bottom of the wagon. During his nap, the oxen became detached and went home. Not exactly master of the situation, and rather doubting his own identity, the man on waking said: "Well, if this *is me*, I've lost a yoke of oxen; but if this *ain't* me, then I've found a wagon."

I beg you, sir, to accept our gratitude on this most happy occasion of a *union meeting* of these two sister societies, by which you do us honor; and our solicitude for your future welfare.

Could we who helped to form this Illinois Society (yours is older and we bow to age) have, in its meagre infancy, seen *this*, it would have been good for our eyes and cheered us through many a dark hour; but, sir, to-day are we here, under the most flattering auspices, for fostering the scientific and the social, and its effect is already felt, as seen by other societies copying our example of a union of hearts and hands. Again let us thank you for this mark of your esteem, and may we hope that at some future time *we* may have the pleasure of returning the compliment.

An Essay was then read on "Abrasion and Erosion," by C. R. E. Koch, of Chicago, which was not discussed until after the reading of an Essay on the "Chemistry of the Oral Secretions, and their Action upon the Teeth," by Dr. E. C. Chase, of Iowa City.

Dr. W. O. Kulp, Chairman of the Executive Committee of the Iowa Society, stated that the programme for a joint convention arranged, was to hold sessions from 2 to 5 o'clock, P. M., and 7:30 o'clock, P. M., until time for the last train across the bridge, for discussions at Davenport; and for clinics, from 8 to 12, A. M., at Rock Island.

Dr. Dean, of Chicago, moved the adoption of this programme by the convention. Seconded.

Dr. Wilson, of Bloomington, moved to amend by excepting this evening. Seconded.

The amendment was lost, and the motion prevailed.

Dr. CROUSE, of Chicago, moved the appointment of a Committee to examine volunteer essays, and to determine whether such as may be presented are proper papers to come before the convention.

The motion prevailed, the Committee appointed upon nomination, consists of Professor Chase, St. Louis; Dr. Hardin, Muscatine; Dr. Honsinger, Chicago.

Dr. CROUSE then stated that the Executive Committee of the Illinois State Society had appointed the following clinical operators, and wished those who did not intend to act to state this, in order that others might be appointed: C. R. Dwight, Danville; E. H. Kilbourne, Aurora; E. D. Swain, Chicago; K. B. Davis, Petersburg; G. O. Howard, Galena; E. Honsinger, Chicago.

Convention then adjourned.

EVENING SESSION.

Convention called to order at 7:30 o'clock. President CROUSE, of the Illinois Society, in the chair.

An Essay was read by G. O. HOWARD, of Galena, on "Removing the Dental Pulp, Preparation and Filling Pulp Canals," and discussed.

The Iowa Society then announced Drs. Cushing, of Chicago, Ill.; Glidden, of St. Paul, Minn.; and Goble, of Dubuque, Iowa; as the clinical operators on its behalf.

SECOND DAY.

The forenoon was occupied with clinics at Rock Island.

In the afternoon, the Convention was called to order, at 2 o'clock, P. M., by President CROUSE.

Minutes of previous meetings were read and approved.

Professor CHASE, of the Committee on Volunteer Essays then reported that only one paper had been presented to them, that this was a finely written essay, but as it was upon a subject not especially connected with the science of dentistry, and as there were already so many papers on the programme to be considered, they had requested its author to withdraw it.

This report was, upon motion, accepted, and committee discharged.

It was agreed that no member should hereafter speak more than twice upon the same subject, without the previous consent of the convention.

Gentlemen present, not members of either society, were invited to participate in the discussion.

The last paper read was then further discussed, after which an Essay: "May the Calcific Elements of the Deciduous Teeth be re-appropriated in the formation of the permanent ones," was read by M. S. Dean, of Chicago, after discussion of which an Essay on the "Anatomy and Histology of the Teeth," by J. P. Wilson, of Burlington, Iowa, was read and discussed. The reading of an Essay on "Contour Fillings," by K. B. Davis, followed next, during the discussion of which, the convention adjourned.

EVENING SESSION.

Convention called to order by President INGERSOLL at 8 o'clock, P. M.

Dr. CROUSE moved a suspension of the order of business, for

the purpose of attending to some miscellaneous business. Carried.

He then moved that the clinic for to-morrow morning be omitted, so that the Illinois Society might hold a business meeting in the morning, and that the two societies might meet at 10 o'clock A. M., in joint session, for the purpose of considering the rubber question. Motion prevailed.

Discussion on the last paper read was then resumed, after which an essay was read by Prof. Chase, of St. Louis, on "The Part which *Vital Action* plays in the History of Dental Caries," and discussed, after which the Convention adjourned.

THIRD DAY—MORNING SESSION.

The Convention was called to order at 10 o'clock by President Crouse, and proceeded to the consideration of the special business, according to previous agreement.

AFTERNOON SESSION.

Convention called to order at 2 o'clock P. M. President INGERSOLL in the chair.

An essay was read by E. D. Swain, of Chicago, on "Pivot Teeth," after discussion of which, G. V. Black, of Jacksonville, read an essay on "Diseased Conditions—their Effects upon the Teeth."

The discussion of this was followed by the reading of an essay on the "Care of Children's Teeth between the ages of 6 and 15 years," by P. E. White, of Davenport, Iowa, which was briefly discussed, and followed by a paper on "Mechanical Dentistry," by W. O. Kulp, of Davenport.

Pending the discussion of this paper, the Convention adjourned.

EVENING SESSION.

Convention called to order at 8 o'clock. President CROUSE in the chair.

Discussion was resumed on last paper read, after which C. Stoddard Smith, of Springfield, Ill., read a paper on the "Elevation of the Dental Profession."

Dr. K. B. Davis moved a suspension of order of business for the purpose of ascertaining when this Joint Convention should adjourn. Carried.

Upon motion of Dr. Kitchen, it was agreed that the Joint Convention adjourn at noon to-morrow.

Dr. KULP offered the following resolutions:

Resolved, That the dental profession should carefully acquaint themselves with the action of the various dental colleges, and should give their influence to only those which are assiduously laboring to elevate the profession, and which are active in advancing its interests.

Resolved, That we look with disapprobation upon the practice of granting honorary degrees by the schools of dentistry or medicine.

Upon motion, this was laid upon the table.

Discussion of the last essay read was then taken up, after which an essay was read on "Prevention and Treatment of Caries on the Proximal Surfaces of the Teeth," by G. H. Cushing, of Chicago.

The Convention then adjourned till 9 A. M. to-morrow.

FOURTH DAY.

Session called to order at 9 o'clock. President Ingersoll in the chair.

The last paper read was then discussed, and followed by an essay, "Unusual Cases in Practice," by A. J. Waide, of Newton, Iowa.

Upon motion, the subject was passed.

Dr. Cushing moved that the matter of printing the proceedings of the session held for the consideration of special business, be left to the discretion of the Publishing Committee.

This was seconded, and, after some discussion, carried.

The minutes were then read and approved.

Dr. W. T. Magill offered the following, which was adopted:

Resolved, That a vote of thanks be, and is hereby, tendered the Ferry Company for the free fare so courteously tendered this body.

The Convention then adjourned *sine die*.

ABRASION AND EROSION.

BY CHARLES R. E. KOCH, CHICAGO.

There is such vagueness in the description of some of the abnormal conditions of the teeth in our literature, as frequently to confuse and preplex one in attempting to define or recognize them one from another. Thus we find the words *abrasion*, *mechanical abrasion*, *spontaneous abrasion*, denudation, erosion, etc., employed to signify conditions of the teeth which, no doubt, could be much easier understood by a more uniform and less profuse nomenclature.

If we sum up all that has been written by the various authors upon these subjects, we find that all the above names have been applied to diseased conditions of the teeth which, beyond question, could be better arranged under two names according to their origin.

The word *abrasion*, has been quite generally applied, but let us examine how properly; the word, in medicine, signifies "an excoriation or suppuration of the skin." As we cannot employ it in that sense to any disease of the solid tooth tissue, we must inquire for its literal meaning, which is synonymous with attrition and friction. Such a definition presupposes mechanical agencies, and for this reason the word *exactly* describes one class of these difficulties, and if its application were strictly in conformity to this meaning, much confusion of terms would be avoided.

As applied to our specialty, we would define abrasion as that gradual loss of tooth-substance produced by the attrition of the teeth upon one another, or that of foreign bodies upon them.

The adjectives chemical and spontaneous have been prefixed to the word abrasion, to distinguish a similar loss of tooth-substance which cannot be attributed to mechanical agencies; but if we adhere to the literal meaning of the word the use of these is plainly inadmissible, and we must look elsewhere for a more proper designation of this diseased condition. Denudation, denution, or loss of tooth-substance by the denuding process, are other terms employed to designate this form of disease, and perhaps it may not be amiss to inquire into the propriety of employing them. According to Dunglison, denudation means "a condition of a part deprived of its natural covering by wounds, gangrene, or abcess; it is particularly applied to the bones when deprived of their periosteum, and to the teeth when they lose their enamel or dental substance, or when the gums recede from them, and their sockets are destroyed." It is plain that, if in its medical signification the word implies all this, it is not specific enough for the difficulty in question. Literally, the word means *a laying bare, depriving of covering,* in this sense, at a first glance, it would seem very expressively applied, but does not abrasion (mechanical) deprive of covering? Does not fracture of the enamel do the same? Does caries not often deprive the pulp of its covering of enamel and dentine? Is not the dentine often laid bare in atrophy? Affirmative answers of these questions clearly prove that although the word is expressive, yet it is not distinctive. Erosion is a word that has very rarely been employed in this connection. In medical language it signifies "the action of a corrosive substance, or the gradual destruction of a part by a substance of that kind,—it is often employed in the same sense as ulceration." Literally, it means an eating away. No doubt this word is more distinctive, and as its definition in medical terminology (excepting the last clause), as well as its literal meaning, is in harmony with its present generally assumed pathology, we shall employ it.

Abrasion

Generally commences upon that portion of the masticating

surfaces which is in apposition with the antagonizing tooth, unless it is caused by the friction of foreign bodies upon the teeth. Prof. Wedl, so far as known to us, is the only author who mentions (as a fact familiar to every dentist) an abrasion occurring upon the proximal surfaces of the teeth, where they come in contact with adjoining teeth, and which is produced by their motion within the sockets during mastication.

The same author also states that from the degree in which the teeth are worn away, taking into the account the variations of color of the teeth, the changes presented by the alveolar border, etc., and also individual peculiarities such as density, we may, after considerable practice, determine the age of the individual within at least five years.

As a rule, the progress of this condition, when owing to attrition of mastication, is very slow, and no discomfort is experienced; and were it not for the deformity of chin coming to meet the nose, which we so often meet with, giving the appearance of toothlessness, perhaps our operative interference would, in most cases, not be called for. It most frequently occurs in men of very rugged constitution, and with broadly-developed jaws and firmly-set and well-shaped teeth. We frequently are told by our patients how their revered ancestors had never lost a tooth, and had "double teeth all around;" they mistaking the result of abrasion for a congenital *lusus naturæ*

Occasionally we find upon the abraded surfaces, especially upon the molars, saucer-shaped indentations, which are much below the general level of the surface and without any corresponding convexity upon the antagonizing tooth, but frequently with a similar concavity opposed to it. These concavities are of a darker color than the surrounding tissue, and generally correspond to the points of original dentification. They probably are created by the attrition of the food after the enamel has become worn away from the prominences, leaving exposed islands of dentine which, being softer, yield more readily than the surrounding enamel. These depressions are generally sensitive to thermal changes.

Mr. Mummery (Trans. Odontological Society of Great Britain, 1865), having instituted extended investigations, claims that there is a notable difference with respect to the form in which, and the means by which, the teeth become worn away. Nations like the Egyptians and the Indians of the northwest coast of America, take but little care in the preparation of their food, which often contains sand; their teeth are usually worn away early. If the food consists of hard seeds, roots, or tough meat, then the surfaces of the first molars are worn upon the lingual side in the upper jaw, and upon the labial side in the lower jaw. With those who subsist on an abundance of highly nitrogenous food the pulps of the teeth gradually become solidified with secondary dentine, and the tooth frequently is worn away as far as the neck without the occurrence of an alveolar abscess; on the contrary, in cases where there is a defective nourishment, inflammations, abscesses, and extensive absorption of the alveoli are constantly observed.

Mr. Charles S. Tomes, in the appendix to his recent work, states that Professor Broca has observed that, in the ancient populations of Europe, caries was far less frequent than at present, but the teeth were usually excessively worn down; but that the mere wear is of itself insufficient to have prevented the ravages of caries, is shown by the fact that the Basque crania (eighty in number) in the Paris Museum were alike remarkable for the extent of the wearing down, and also for the tolerably frequent occurrence of caries.

Abrasion being always plainly attributable to mechanical causes, it would be difficult to prove that any particular condition of the affected tooth is an essential to its beginning. It is even doubted whether temporarily diminished vital function within the tooth may be considered as furthering the progress of the malady, as teeth with devitalized pulps do not appear to abrade in a more rapid degree than those with their vital organs entirely unimpaired.

Abrasion of individual teeth may be owing to a malarticulation, either original or acquired. Thus, a lateral incisor twisted upon its axis so that one of its corners strikes the antagonizing tooth

squarely, is liable to have this corner abraded. The extraction of some posterior teeth, by throwing the weight of mastication upon the anterior, will very soon cause abrasion upon these. The loss of any tooth may in time be followed by a change of articulation of the remaining teeth, and subject some of them to abrasion.

An ingrowing upper incisor will almost invariably become abraded on its anterior cutting edge, so as to make an inclined plane of it. It is somewhat singular in these cases that the abrasion always occurs on the tooth that is out of its normal position, and may not this be accounted for by a constant desire, so to speak, of the tooth to correct its malposition and movement in that direction, as particle after particle becomes worn away? Such cases we often meet in children of tender years.

Friction of badly-adjusted clasps and ill-fitting plates may abrade the surfaces of the teeth in contact, but in most all such cases these abraded surfaces soon become the seat of caries. Yet cases do occasionally occur where the enamel had become entirely worn through, and considerable inroad made upon the dentine, and yet there was no sign of caries.

A middle-aged man, who had lost his upper incisors, and was in the habit of using a clay tobacco-pipe, holding it between his right cuspids, had these so abraded that when his jaws were closed there was a round opening between them freely admitting a lead-pencil.

Other mechanical agencies, such as too stiff tooth-brushes and gritty and insoluble tooth-powders, have been charged with the gradual wearing away upon the cervical border of the buccal and labial surfaces; but it is deemed very doubtful what influences, if any, such agencies exert in producing these cases in teeth with perfectly healthy enamel.

Treatment of abrasion from mastication can hardly be other than mechanical, and consists in preventing the further attrition of the teeth by substituting gold for the worn-away substance, in such of the teeth as shall appear to be the most favorable for the operation and its success. When abrasion is of rapid progress and accompanied by great sensitiveness of the teeth, it may

sometimes be necessary to make swedged caps of gold from an impression of the teeth, leaving these a little larger than the teeth, by placing some paper or sheet lead or tin upon the male die. The tooth to which this cap is to be applied being thoroughly dried, some oxychloride of zinc is prepared, put in the cap, and the appliance then placed in position. This may be removed from time to time for examination, and finally, after the tooth is strong enough, a permanent gold filling may be substituted for it.

If the abrasion is produced or furthered by an unnatural grating together of the teeth, frequently by calling the patient's attention to the fact it may be to a great extent avoided.

When individual teeth have become abraded through friction of clasps of artificial dentures, these should be so altered as to prevent further rubbing.

Abrasion upon the proximal surfaces, described as *interstitial* by A. Zsigmondi (in *Virteljahrschrift fur Zahnheilkunde*, 1865) can scarcely be reached by remedial treatment, unless it becomes the seat of caries. Irregular position of individual teeth, which predisposes them to abrasion in such a degree as to jeopardize their beauty or usefulness, should be corrected. The loss of certain teeth having produced a change of articulation, which has resulted in abrasion of certain teeth, and which is of such a nature as to threaten a deformity of these teeth, may often be remedied by the insertion of artificial teeth to complete the denture. Perhaps, in this connection, it may not be uninteresting to cite a case that has come under my care.

In the mouth of a gentleman who had lost his upper bicuspids and first molars, the other molars gradually tipped forward, and at the same time the lower jaw moved forward so as to form a very marked protrusion. Some of the upper incisors had been built out with gold, and these fillings, as well as the teeth, were being fast worn away upon the anterior cutting edge. A gold atmospheric pressure plate was inserted, with three bicuspids upon each side, so as exactly to fill the space of the lost teeth, and long enough to prevent contact of the upper and lower front

teeth, by obviating the forward motion of the lower jaw, as also of the remaining upper molars. At first "all went merry as a marriage bell," the suction perfect, no more abrasion; but soon the part of the plate upon the outer alveolar ridge began to irritate the membrane; it had to be cut down until finally nothing remained of it; it was then discovered that the suction was becoming weak, and the anterior teeth again approached within dangerous proximity. The force of mastication had spread the plate laterally, and the thing was a failure.

Gold fillings were then inserted in carious cavities properly enlarged in the second lower and upper molars, so as to raise their grinding surfaces considerably; the plate was then readjusted, so as to leave a space of about a line between the anterior teeth when the jaws were closed. About a year afterwards it was found that the front teeth were again beginning to touch, and that the outer cusps of the first lower bicuspids, as well as the upper canines, had become considerably abraded, these teeth having been thrown in apposition by the change in the articulation. Cavities were formed in the gold fillings in the upper molars, and their surfaces raised so as again to throw the jaws apart. The lower bicuspids, which were getting somewhat sensitive, had cavities formed in their abraded surfaces upon the outer cusps, and were built up so as very nearly to touch the antagonizing canines, after which these were reinforced with gold, so as to meet the bicuspids below. After these operations it was found that the teeth upon the plate were too short, and the plate was again remodeled so as to make the antagonism perfect from the first bicuspid to the last molar. It is nearly a year since then, and apparently a success.

Erosion

Closely resembles abrasion in its morbid anatomy; but its pathology is very much enshrouded in darkness. It differs from abrasion in that the localities of its occurrence almost invariably preclude even a possibility of mechanical exciting causes. From caries it differs in that it is almost exclusively confined to the

labial and buccal surfaces, very rarely attacking the cutting edges of the incisors; that it is not symmetrical in its occurrences, and the most marked difference is that, while a carious location always contains more or less disintegrating or decomposing substance, there never is anything of the kind perceptible, either by touch or vision, in localities affected by erosion; but these always present a highly polished appearing surface, and the difficulty is generally manifested by the formation of transverse grooves upon the enamel near the cervical terminus, and occasionally by blotches upon the surface like those made with a scraper.

The etiology of this disease has been a stumbling-block in the researches of nearly all authors. Thus, Mr. John Tomes believes it of strictly mechanical origin; Garretson, a disease of predisposition, the result of impressions at the period of enamel formation; Fox looks to the saliva and friction of the lips for its cause; Hunter thinks it a disease inherent in the tooth, and not dependent on circumstances in after-life; Bell ascribes it to mechanical agencies, upon certain, from some cause predisposed, circular depositions of enamel; Harris believed an acidulated buccal mucus the cause; Taft, while not advancing any theory, inclines to the opinion that some secretion of acidulated buccal mucus is instrumental, and that the difficulty may be controlled by constitutional treatment, but does not indicate wherein this should exist. In an article from the German, which appeared in the August number of the *Missouri Dental Journal* for last year, the author suggests that the disease may consist of an analogous process to that of the resorption of the roots of the deciduous teeth, by a fluid secreted at the margin of the gums, in combination with a predisposition in the teeth concerned.

Still another authority, Dr. Nuhn, accounts for erosion upon the cutting edge of the front teeth by the secretion of an, in certain diatheses, acidulated mucus, secreted by a gland discovered in the tip of the tongue. Professor Wedl says: "The fact that such defects never occur upon the lingual surfaces of the neck indicates that their cause is to be sought for upon the facial side. Sometimes the mucus membrane of cheeks and lips is raised into

a fold opposite the dental arches. In many cases there is a tendinous expansion upon the facial surfaces of the gums of the lower jaw, which gradually becomes narrower, and terminates with a ridge of connective tissue, which is attached to the neck of a bicuspid or molar tooth. It may be well to consider in future cases whether any relation exists between the defects upon the neck of the tooth and these folds or ridges."

Among these many theories, that of Mr. John Tomes no doubt is the most astonishing, and we can hardly understand how so astute an observer as he could be led to say, "In the many cases that have come under my own notice, I do not think that a single example has presented itself in which the grooving could not be attributed to the action of the tooth-brush or to mechanical action in some form," except on the hypothesis that he had in view another form of disease. In cases where the cementum has become exposed by a recession of the gums, we frequently find a softening of this and the dentine, which may become the seat of caries. This altered tissue the use of a stiff tooth-brush or gritty tooth-powder may be instrumental in removing and form into a groove, which ultimately may extend to, and undermine, the enamel; but such cases are not the ones now under consideration, as erosion primarily attacks the enamel.

In this respect it afforded me much pleasure, upon referring to a recent revision of the work by Mr. Charles S. Tomes, to find an entirely new chapter on erosion, in which the reviser speaks of a condition of the teeth closely simulating the appearance produced by mechanical abrasion, caused by the friction of the tooth-brush, and which now and then attacks teeth in localities not accessible to a tooth-brush. He figures a case of a canine, with the grooves extending back on both sides of the neck of the tooth, and distinctly undercut; also two incisors, with erosion upon the lingual surfaces of the crown. He also states having observed it in a patient who rarely or never resorted to the use of a tooth-brush. And as further proof that erosion does occur independent of mechanical abrasion, he cites the observation of Dr. Murie, who found that the teeth of a sea-lion (*Ottaria jubata*) had been thus

wasted, and the places most affected were those least exposed to mechanical influences. He further states that this condition, in such an extreme, is not common, but that he has himself observed an approach to it in the teeth of other specimens of ottaria and in the proboscis seal. In summing up, Mr. Tomes says, "And it seems that we must fall back upon the idea that it is an example of chemical solution;" and further, "it seems probable that mucus, by fermenting or affording a nidus for fermentation, may provide an acid solvent."

Wherein predisposition to this disease may lie will be hard to determine. Any interruption to the nutrition during the formation of the teeth we would expect to see manifested upon contemporary teeth alike, and hence we should expect to see such attacked in like manner. But this is not the case. Yet we are very far from asserting that such predisposition does not exist.

Making this disease dependent upon an analogous process to absorption will probably not find many adherents, as it would be difficult to explain how this could be accomplished unless the vessels were always in contact with the tissues they are to absorb, which clearly is not the case, as where the disease commences upon the enamel at a remote point from the gum.

At this time the most general belief undoubtedly is that the disease is a process of chemical dissolution.

In order to ascertain whether this generally-accepted theory of chemical decomposition can be practically demonstrated, or a like effect produced out of the mouth, we instituted a series of experiments, which, although they do not *prove* anything in this direction, as the conditions of extracted and living teeth are entirely dissimilar, may yet be of interest to be here stated, as they may be of service as a starting-point in further experiments.

We were fully aware that similar experiments had been instituted in investigations upon caries by Westcott, Allport, Mantegazza, Leber, Rottenstein, and Magitot, but the details of their procedures are not very accurately stated.

A number of anterior teeth, twelve of them of two twin sisters, aged about twenty years, were placed in solutions of the following

named acids and alkalies, of a strength of 1 to 32 of water, all of the acids being concentrated or glacial. The bottles containing the different substances were placed in a wooden box, and kept upon the top of a tin warming-oven, attached to the back of a kitchen stove. In this way a very even temperature, of very little above blood-heat, was kept up during the day-time. The teeth were frequently removed from these solutions, and washed with a stiff brush transversely, and occasionally with a stiff polishing brush on a lathe; but no appearance similar to that of erosion could be produced, although in some cases, where a friable calcareous mass remained, this was removed. The effect of the different substances was recorded at the end of each week, and is as follows:

Experiment 1.

Hydrochloric Acid.—First week. The cutting edges of tooth converted into a flexible feather edge; tooth very much reduced in size; very little enamel remains; cementum to the eye seems not acted upon, but the finger-nail entirely removes it.

Second week. Enamel entirely gone; dentine a mere stiff cartilage; tooth removed and placed in solution of caustic potassa.

Citric Acid.—First week. Action rather more decided than the hydrochloric acid, and of the same nature.

Second week. Tooth a flexible mass; placed in caustic potassa, with tooth from hydrochloric acid bottle.

Lactic Acid.—First week. The enamel is affected over its entire surface, being in appearance a chalky mass; brushing removes it partially, leaving a milky etched surface.

Second week. The enamel on cervical half of crown entirely gone; cementum only little softened.

Third week. Only a small portion of the enamel left upon the cusp of the tooth (a cuspid).

Valerianic Acid.—First week. No perceptible action.

Second week. Enamel on cutting edge etched (this was an abraded surface); anterior surface still glossy.

Third week. Whole surface of enamel chalky; cementum softened.

Acetic Acid.—First week. Action not perceptible on enamel.

Second week. Cementum softened; no action visible on enamel.

Third week. Somewhat etched on proximal and lingual surfaces; gloss still remains on labial surface.

Oxalic Acid.—First week. No visible action.

Second week. No action upon enamel, except a softening around carious locality. Root of tooth was exostosed, and this hypertrophy converted into a calcareous mass.

Third week. No action upon gloss of enamel.

Tannic Acid.—First week. No visible action.

Second week. No action, except the tooth is getting brown.

Third week. No disintegration, but deep discoloration.

Eighth week. Tooth entirely black and rough over its entire surface.

Tartaric Acid.—First week. Enamel etched over its entire surface, presenting a crystalline surface, easily scraped off with a knife.

Second week. Etching deeper, with sparkling prisms; cementum slightly softened.

Third week. The etching still progresses.

Malic Acid.—First week. Action decided all over; cementum easily removed with finger-nail; enamel on outer surface chalky.

Third week. Enamel chalky, dentine softened.

Nitric Acid.—First week. Cementum very much softened; enamel around cervical border gone, dentine under it softened,

Second week. Very little enamel remains; tooth similar in appearance to that acted upon by citric and hydrochloric acids. The tooth was removed and immersed in a solution of caustic potash, of a strength of 1. to 480.

Uric Acid.—After four weeks, no action could be discovered, which was probably owing to the fact of its almost insolubility in even boiling water, ether or alcohol.

Sulphuric Acid.—First week. Enamel deeply disintegrated.

Second week. Nothing remains of the entire tooth; liquid is still acid, but of a milky appearance.

Carbolic Acid.—No action whatever can be discovered after four weeks' time.

Caustic Potassa.—Two teeth. After two weeks, no action could be discovered on either tooth. Teeth were removed, and placed one in the citric and the other in the hydrochloric acid bottles.

Bicarbonate of Soda.—After four weeks, no action could be discovered.

EXPERIMENT 2.

Caustic Potassa.—The teeth from the hydrochloric and citric acid of the first experiment were immersed into this, of a strength of 1 to 32, which had previously contained two teeth which had been distributed to the citric and hydrochloric acids. After two weeks, no solid substance remained of the tooth that had previously been acted upon by the citric, and only a very small portion of the root of that from the hydrochloric acid remained.

The tooth from nitric acid, after one week's maceration in a solution of caustic potassa of a strength of 1 to 480, was considerably diminished in size, showing action upon the cartilaginous substance.

Citric Acid.—One of the teeth from the caustic potassa of the first experiment, immersed in the acid that had been used in the first experiment, after one week presented the appearance of a popped grain of corn; the pulpy matter being removed, showed under it a cartilaginous substance,

Second week. Appearance again as in first week; action much deeper; cartilage remains a little harder than in the first experiment.

Hydrochloric Acid.—The other tooth, from caustic potash, after one week showed no action on enamel, though the cementum was softened.

Second week. Enamel slightly acted upon, but not nearly in the same degree as that in the citric acid.

All of the agents after these experiments, which for convenience sake have not been recorded beyond the time stated, as time has

not effected any marked changes from those mentioned, gave still a decidedly acid or alkaline reaction, showing that their potency was not entirely neutralized, with the exception of uric acid, which does not react upon litmus.

But as it may be objected that these agents were all in a more concentrated form than they would under ordinary circumstances be apt to occur in the system, still a further experiment was instituted. In this the strength of the substance was 1 to 480, ten of the teeth coming from a lady between forty and fifty years of age. Surfaces were ground upon these so as to expose the dentine, with a fine emery wheel, and polished with a felt wheel. After three weeks' treatment in the same manner as in the other experiment, and daily removal of some of them for brushing, the result was as follows:

Experiment 3.

Tartaric Acid.—Same crystalline condition off enamel as in Experiment 1. Easily removed with finger-nail. Exposed dentine softened, as also cementum.

Sulphuric Acid.—A calcareous disintegration over entire surface of root and crown.

Butyric Acid.—Cementum easily shaved off with knife; no action visible on enamel or exposed dentine.

Hydrochloric Acid.—Cementum softened; enamel partially removed, and the remainder of a horny appearance, but not impressible with a knife. Exposed dentine apparently not affected.

Nitric Acid.—Action scarcely perceptible, with the exception of slight etching on the sides of the enamel; no action on exposed dentine.

Acetic Acid.—Cementum easily shaved with knife; no action on dentine or enamel perceptible.

Phosphoric Acid.—Cementum softened, no action perceptible on either enamel or dentine.

Citric Acid.—Two teeth molar (from boy twelve years old); very slightly acted upon in all its tissues, so far as action of the

knife is concerned, and very much bleached. Bicuspid (of lady past forty); no action whatever could be discerned.

Oxalic Acid.—The entire tooth very much acted upon, especially the dentine and cementum.

Lactic Acid.—Cementum very much softened; enamel somewhat chalky on outer surface; dentine apparently not affected.

Malic Acid.—Cementum can be shaved with the knife; gloss of enamel not affected; slight action on dentine.

Saccharated Pepsine.—A slight action upon the cementum perceptible by the use of knife. This was a saturated solution, the sugar of which had no doubt entered fermentation; it smelled like soured yeast, and the action was undoubtedly owing to this fact.

These results do not fully accord with those of the various authors mentioned, the most particular point of difference being in the action of acetic acid. Messrs. Westcott, Allport, and Mantegazza, and Leber and Rottenstein, found this agent very active upon the enamel, while in my experiments I failed to discover this, but find, as did Magitot, that it acts more particularly upon the cementum. I used the glacial acid. There are some other points of difference, but this is the most essential.

We find that all the organic acids act powerfully upon the enamel, with the exception of tannic and acetic—and especially first upon the cervical and proximal surfaces.

Of all the acids tested, sulphuric acid alone, in the strength of one to 32, destroyed the whole tooth-substance, leaving nothing but a granular sediment in the bottom of the vessel.

Citric acid and hydrochloric in the strong solution appear alike in the intensity of their action upon the first teeth placed in them, but after having decalcified one tooth, the former acted by far more powerfully on the second than the latter.

In the weaker solution citric acid was not nearly as active as some others, that did not compare with it in potency in the experiment with the stronger solutions.

Caustic potassa seemed harmless upon the healthy tooth-substance, either enamel, dentine, or cementum, and very little action was perceptible upon the carious substance; but after the teeth

U. OF ILL. LIB.

had been decalcified by maceration in hydrochloric and citric acids, it entirely destroyed the cartilaginous substance remaining, whereas teeth that are first macerated in the caustic and then in these acids will still retain their shape in a cartilaginous substance. Is not this proof that alkalies are not primarily the cause of tooth destruction?

In the weaker solutions, the teeth which had been ground so as to expose the dentine we found that this was acted upon more than the enamel only by malic and oxalic acids, otherwise the action was either not in excess of that upon the enamel, or none at all.

None of the acids or alkalies in either experiment produced an appearance similar to erosion or caries, and, with the exception of the strong solution of oxalic acid and caustic potassa, no deterioration around carious localities could be discovered, beyond that upon the healthy tissues.

Undoubtedly microscopic sections of the teeth so macerated may reveal to us some facts that the eye, only weakly aided as in these experiments, did not perceive.

The fact that no similar appearance to erosion can be artificially produced by the action of chemical agents, with the addition of such mechanical force as the teeth could be subjected to in the mouth, would lead us to doubt the entire correctness of either the purely chemical or mechanical theories as to its origin, and we are hence much more inclined to the opinion that some truly pathological condition, either congenital or acquired, is a predisposing cause, which is aided and abetted by the chemical reagents and perhaps mechanical means.

Yet, even admitting that chemical dissolution is the sole cause of the difficulty, its pathology is by no means explained. It remains still to be seen whether particular constitutional conditions, and consequently defective nutrition, are concomitants of it, and how certain teeth should become thus acted upon and not others.

We still want to learn whether the dissolution is brought about by a secretion of the mucous membrane at its gingival margin, or from its labial or buccal portion; or whether the solvent is

obtained from the saliva or derived from the food either as such or by fermentation in the mouth; or some of these, or all combined; or whether certain mucous follicles may secrete acidulated mucus and not others, so as to act upon the particular localities of individual teeth in contact with them and no others; and under what circumstances these secretions are made active; and finally, after having fully ascertained all these points, we want to know what prophylactics to employ.

It is somewhat singular that, so far as known, no attempts have ever been made to demonstrate the many theories advanced, unless the annexed extracts from Leber and Rottenstein's recent work on Dental Caries may be considered as such. Certainly this disease offers a large field for investigation, and it is hoped that those versed in histology and the use of the microscope will endeavor to give us a satisfactory solution by actual research and experiment.

Leber and Rottenstein describe a *form of caries* which attacks the necks of the teeth, and forms there a smooth gutter-like furrow. In two cases examined by them anatomically, in a longitudinal section, they found, in one case, proceeding from the gutter, only a feeble trace of a brownish cone looking towards the pulp cavity, for which reason the changes which precede the caries of the dentine, extended to but a slight depth, and were not marked. The density of the dentine was but little less than normal; there was, just below the surface, a slightly marked brownish shade. Under the microscope, they observed in this superficial layer, as usual, the dentinal canals filled with leptothrix. In the other case, a vertical section presented the form of a triangle, with its base turned outwards, and its vertex towards the cavity of the pulp. On the lower side of this triangle there appeared a brownish cone, directed towards the pulp cavity. Upon the interior surface of the pulp cavity, at the place corresponding to the gutter without, there was found at the extremity of the brownish cone, a projection formed of dentinal substance of new formation, which had penetrated the pulp cavity to some depth.

In this observation it was evident that the caries was of a very slow progress, but had, notwithstanding, all the essential characters of this affection. And further on they say: "To explain, therefore, the polish of the surface, we can invoke only the action of the brush and the friction of the lips and of the tongue." Still further they say: "If we consider isolated facts of this kind, we feel little disposed to take the phenomena for symptoms of veritable caries; but by analogy with other facts, where the nature of the caries is shown, we are compelled to admit equally for these exceptional cases, that we have to do with a caries whose progress is very slow, which for a time may be really stationary, and afterwards take on new life under the influence of favorable cause." And again they say: "It would appear that the cause of this caries is the denudation of the neck, by the absence of gum. Upon the slightly rough surface of the cement, fermenting mucus and fragments of food are more easily deposited, and these same agents fixed between the gums and the neck of the tooth are less easily removed. It may then happen in cases where the injurious causes are weak, or the teeth of a special hardness, that it is just the necks of the teeth which are more likely to be affected." In reference to erosion upon the cutting edges, they observe: "For want of sufficient observation, it is not possible for us to say if these morbid phenomena belong or not to caries. The form of the wasting does not permit us to attribute it to mechanical action."

It does not appear from the above that the cases investigated by them are such as in this paper are designated as erosion, as this occurs primarily upon the enamel.

As we do not know the causes of this disease, no dogmatical treatment can be pursued, but, on the hypothesis that acids are the active agents in dissolving the enamel, an antacid locally applied certainly can do no harm, and allowing that mechanical forces are the means of removing the changing tissues, the transverse use of the tooth-brush should be avoided. Mr. Charles S. Tomes recommends soft tooth-brushes and alkaline dentifrices.

Perhaps it might not be bad practice to follow out the hints contained in "Garretson" and "Taft" upon constitutional treatment. Prof. Garretson is in the habit of administering the lime tonics. We would suggest the trial of the syrup of the lacto-phosphate of lime.

When the disease has already progressed to some depth, the lost part should be restored artificially. And it would be safer to expose an entirely new surface before attempting to fill, just as we would do in a carious cavity before introducing the filling. Mr. Charles Tomes says, for the arrest of the progress of this malady by filling, gutta-percha is often found exceedingly efficient.

In cases of erosion of the cutting edges of the incisors, which must of course affect speech, a liberal cutting away and replacement of the lost portion by gold or artificial tooth crown would, no doubt, be correct treatment.

Let us not be forever content to say, as we have heretofore done, when speaking of the causes of erosion, "I don't know;" but after this let us observe closely all such cases, and record them, their history, temperament and habits of patient, condition of teeth generally, of secretions, and any other fact that may be worthy of note. If all these recorded cases are then compared, some facts may be evolved, that if each is simply confined to his own observation, we could never know.

Discussion was postponed until after the reading of the next essay.

CHEMISTRY OF THE ORAL SECRETIONS AND THEIR ACTION ON THE TEETH.

BY EDWARD C. CHASE, IOWA CITY, IA.

Of all the many subjects within the boundless realm of dental science, none can be of more interest and importance to the scientific dentist than the study of the physiological and chemical properties of those fluids which continually bathe the objects of his solicitous care and pecuniary support.

The teeth, constantly washed, as they are, by fluids poured into the mouth from sundry glands, and these fluids impregnated by noxious gases resulting from the putrefactive decomposition of particles of food, are absolutely under the influence and control of these liquids. This being the case, then, not only the integrity of the teeth themselves, but the permanence of our operations upon them, depend upon the chemical condition of these oral secretions.

It matters not how thoroughly nature may have impacted the lime salts or closed the enamel seams, if the mixed secretions contain the fatal acid, whether mineral, amylacious or albuminous, the pearly citadel is besieged and will surely fall. While, on the other hand, through ignorance of hygienic laws, or other obscure causes, the vital forces have been arrested or perverted from their legitimate channel, there has been a deficiency of the inorganic material, and the teeth consequently but imperfectly calcified, still they will be able to maintain their integrity of form so long as their aqueous surrounding is free from the insidious enemy, *acid.*

Under the head of oral secretions are included the products of all those glands whose excretory ducts open within the boundary of the oral cavity; consequently we will have to consider the mixed secretions of the parotid, the submaxillary, sublingual and the mucous glands. These latter are named "labial," "buccal," and "lingual," owing to their location. It is this, the common or mixed saliva, that interests us as dentists in a practical point of view. To the physiologist or physiological chemist, a thorough and minute knowledge of the chemical properties, including a correct analysis of the secretions of each individual salivary gland, is not only interesting but quite imperative; but from our standpoint of observation we care more for the effects produced—if any—by the oral secretions upon the teeth, and as these are brought about by the agency of the mixed saliva, we will proceed to consider it as such.

Probably no secretion of the human body has given chemists more trouble to analyze, and none has given more varying results, than the saliva.

Even the same saliva, analyzed by two equally good chemists, has been known to give quite different results, owing to different methods of analysis; while saliva taken from the same mouth and analyzed by the same man will frequently differ quite materially in the quantity and quality of its constituents. In making an analysis of the saliva, the first question that naturally presents itself is this: "Will it give an acid or alkaline reaction?" In two hundred examinations made by an eminent member of our profession, who is here with us to-day, upon a like number of apparently healthy individuals, he found the saliva acid in one hundred and ninety-eight cases; two cases in which it was neutral. In most of these cases a slightly alkaline reaction was observed, however, just before eating; but as soon as the meal was over, its character was immediately changed to an acid fluid, and remained so until the time for eating arrived again. Of about fifty mouths examined by myself, two or three were found neutral and the rest acid. These latter examinations were made from one to three hours after eating. It is held that acidity of the

saliva is an indication of disease; that it is abnormal. Still we find this condition present in the mouths of people who have the appearance of perfect health and teeth entirely free from decay. The fact is, most of us are living artificial lives in our dress, habits of body, and the food we eat. If we were living in a perfectly physiological state; if we took our food as furnished us by nature, before it had passed through the hands of men to be deprived of its life-sustaining elements and tissue-making principles, the results might be different; for no one will question the fact that the character of all the secretions of the body, the saliva included, depends to a great extent upon our manner of living.

By extrinsic examinations made upon animals by the experimenter heretofore referred to, he found that animals which were free to roam wherever they chose in search of food and drink, that almost invariably their saliva gave an alkaline reaction; while on the other hand, stall-fed animals, animals that were not allowed sufficient exercise, that were deprived of the beneficial influence of the sun, that were fed upon slop and kept in damp, hot stables, and were living an entirely artificial life, that the saliva of these animals gave a decidedly acid reaction.

In alkaline saliva the analysis shows the alkalinity to be due to the presence of tri-sodium phosphate. The acidity may be due to any of the following acids, viz: Acetic, lactic, oxalic, uric, hydrochloric, nitric, and sulphuric.

The three first are formed probably and become constituents of the saliva, either in the secreting gland itself, or in the mouth by the decomposition of mucus, epithelium, or food remaining about the teeth. These acids, with hydrochloric, have been found in the saliva by actual analysis. The latter—hydrochloric—is probably formed in most cases by galvanic action, which decomposes the chlorides and water, thus furnishing the necessary elements for its composition; and particularly is this the case when there are different oxidizable metals in the mouth, thus presenting all the apparatus for a complete battery.

The presence of uric acid in the mouth may be caused by retention of the urine, or by disease of the kidneys, which fail to

eliminate it from the blood. Nitric and sulphuric acid have never been detected, as far as my knowledge extends, in the saliva, but nevertheless they are thought by some to be present in that fluid under certain circumstances, from the effects which are observed upon the teeth.

You probably have all seen mouths in such a condition that it would not have excited the least surprise in your minds if told there existed any chemical combination whatever—mouths filthy beyond comparison. In such mouths I not only believe the conditions are present for the formation of the two last named acids, but I believe they are formed and act chemically upon the teeth

We know that sulphur is present in albumen and other organic compounds that exist as proximate principles of a large class of food. Now, during the decomposition of any of these substances, sulphur is eliminated, and being in a nascent state will combine either with oxygen, forming sulphur*ous* acid, or with hydrogen, forming sulphureted hydrogen, and either of these might be so acted upon by other elements as to result in the formation of sulph*uric* acid.

Nitrogen also being a constituent of a large class of aliment, is eliminated by the decomposition of the compound, either in company with oxygen, with which it forms five different compounds, or with hydrogen, forming the well-known compound ammonia. Either of the above combinations of nitrogen are capable of further change, and may finally terminate in nitric acid.

The most reliable analysis of saliva that we have, gives in 1000 parts about 990 of water and 10 of solid material. In the latter are included the organic principle ptyalin, chlorides of potassium and sodium, lactates of potassium and sodium, sulphocyanide of potassium, phosphates and carbonates, epithelium; and in alkaline saliva, tri-sodium phosphate.

The presence of sulphocyanide of potassium is proven by the blood-red tint imparted to saliva by the addition of the sesquichloride of iron. If the sulphocyanide of iron is formed, by the application of heat the color will temporarily disappear; or by

the addition of the bi-chloride of mercury the color is entirely destroyed.

Mixed saliva possesses other chemical properties besides alkalinity and acidity; it has the extraordinary metamorphic power of converting starch into sugar with wonderful rapidity. Numerous experiments have been made with the view of ascertaining what particular component so acted upon starch as to produce this interesting phenomenon, and all go to show that it is due to the organic principle ptyalin, together with the mucus of the mouth.

Enough has been said now to prove that the saliva exerts a great influence upon the teeth, depending upon its chemical conditions. It may cause and promote decay, or it may effectually prevent it, as the case may be. Want of time prevents us from reviewing the physiological and other interesting properties of the saliva, and I will hasten to consider the one other great action it has upon the teeth, second only in importance to the part it plays in dental caries. I refer to the deposition from it of the elements composing salivary calculus, or tartar.

But few mouths, if undisturbed by either brush or pick, would be found exempt from this deposit; while in the large majority of those that receive the ordinary attention of a most thorough washing, at least once a day, will be found traces, at least, of tartar. The normal proportion of phosphate of lime is about 6 parts in every 1000 of saliva. This proportion may be morbidly increased, of course, as Dr. Wright found in one case 14 parts in 1000. That tartar is formed by the precipitation of this phosphate of lime and other insoluble substances from the saliva, there cannot be a doubt.

I will now quote from an article bearing directly upon this subject, written by myself and published in the Missouri Dental Journal, Vol. IV., No. 5:

"We find that the most reliable analysis of tartar gives from 60 to 75 per cent. of strictly inorganic matter, the balance being made up of mucus, fibrin, epithelium and water. The inorganic portion is that with which we have to deal.

We have seen that the phosphate of lime exists *as* phosphate of lime in the saliva; hence it is simply precipitated from this fluid, undergoing no chemical change.

The saliva from all the glands, while being secreted and while passing from the mouths of the ducts, is normal, but after it has once become mixed, or even as soon as it becomes exposed to the air, it is immediately changed from an alkaline to a neutral or slightly acid fluid. This can easily be proven by any one with litmus paper. This change may be brought about in two ways: First. The acids resulting from the putrefactive decomposition of particles of food or epithelium (the presence of which is the chief if not the only cause of dental caries) coming in contact with the saliva, would instantly unite with the free soda, and, if powerful enough, decompose the lactates, setting free lactic acid and uniting with the bases, forming salts; thus, if hydrochloric acid were present, there would be formed the chlorides of calcium, sodium and potassium, with the liberation of lactic acid.

Second. The neutrality or acidity might be brought about by the carbonic acid, which passes off from the system in large quantities by each exhalation of air from the lungs. This coming in contact with every portion of the saliva as soon as it is emptied into the mouth, would tend to transform it immediately to an acid fluid; and particularly would this be the case in the mouth of one who exhaled through this cavity instead of the nostrils.

The saliva now being changed chemically, the conditions favorable to the solution of the phosphate of lime, of course, are not present, and this substance is precipitated as an insoluble powder. It now finds its way between the margins of the gums and necks of the teeth, and is slowly but constantly deposited, first in the interstices of the enamel, and thus gets a firm hold, and then layer upon layer is piled on, until, in time, if nothing interferes, there is formed a huge mass, which becomes the seat of disease and corruption, and even of animal life. Now, from whence is the carbonate of lime? We have already seen that the mixed saliva is slightly impregnated with carbonic acid coming from the

lungs; this, then. might act upon the lactates of lime, soda and potassa, forming carbonates of them all, and we would have carbonate of lime, carbonate of soda and carbonate of potassa. Now it is a well known chemical law, or fact, that carbonates of the alkali metals, such as potassium, sodium, ammonium, are soluble, while the carbonates of the alkaline earths, such as calcium, strontium and barium, are insoluble. The carbonate of lime belonging to this latter class, and therefore insoluble, would be precipitated as a white powder, and, like the phosphate of lime, would lodge in all protected places on the teeth, and with it make up the bulk of tartar as found in the human mouth. During sleep the conditions are most favorable for its rapid formation; it is then that the parts are in almost perfect rest; hence it remains when deposited. Now it is that respiration proceeds through the mouth, and the supply of carbonic acid is abundant.

From the foregoing will be seen the importance of preserving the normal alkalinity of the saliva, for upon this property depends its power of retaining in solution the principal ingredient of tartar or salivary calculus.

DISCUSSION.

Dr. Chase, of St. Louis, said it seemed to him that one idea, and an important one, had been entirely left out of the theory in erosion, namely—*vital action.* True *abrasion* always is mechanical. Where the tooth is worn down below the enamel, there is a smooth, glossy substance, harder than even the enamel itself, this is not caused merely by friction, but the ends of the tubules have become filled with lime salts, just as a portion of the pulp may become solidified.

In regard to erosion, does not think it owing to chemical action, and that it occurs in places where no mechanical abrasion could have produced it, was true. But what has caused it perhaps no one could at present explain. May it not be vital action?

Wished to impress the fact that vital action will soften and absorb the dentine from under a perfectly water-tight filling. Had observed cases in which, after the tooth had been filled for four years, he had found, upon removal of the filling, that the pulp was largely exposed—could not suppose that this condition had existed ever since the tooth was filled, four or five years ago. This is vital action. It has been stated that, in order to absorption, the tissues to be absorbed would have to be in contact with the vessels, this is not necessary, the red blood-vessels are not essential to it, as absorption took place in cases where they are not within twenty inches—referred to the umbilicus.

There certainly is a basal structure in the enamel, the columns have a skin which is supplied with the plasma of the blood, and he does not doubt that absorption may go on through this. It is easily to be seen that not only the lime salts, but also the organic matter may thus be carried off. Wished to impress the idea that vital action has much to do with caries. What do we see in the milk teeth? This same vital action has carried off a large proportion of the dentine, and sometimes in lifting off the caps of enamel remaining, we find that even this has been acted upon to some extent in this manner, it being much thinner than it would be in the natural condition.

Dr. Koch stated that in his paper, he denied an analagous process to absorption of the deciduous teeth, in the removal of tooth substance by erosion, simply because, in the absorption of the deciduous teeth, there is always in contact with the tissues to be absorbed, a highly vascular plexus, which was entirely wanting in erosion.

Dr. Black, of Jacksonville, Ill., wished to say, in reference to absorption of the walls of the pulp chamber, that it is owing to inflammation, swelling of the pulp, and consequent pressure, but he could not see where any such influences could act upon the outer portion of the enamel. Does not think absorption could occur, unless the absorbent spoken of was lying in contact with the enamel. The appearance of erosion is not like the result of

acid action, and if brought about by an acid, it must be in a manner different from the observed action of acids.

Had a case of erosion upon the proximal surfaces of all the upper teeth, anterior to the bicuspids, the patient had never used a tooth-pick, and cleaned his mouth but seldom, yet his mouth was in a clean and healthy condition, and unless this be caries, there was none.

THE REMOVAL OF PULPS, PREPARATION AND FILLING OF PULP CANALS.

BY G. O. HOWARD, GALENA, ILL.

Little or nothing new will be found in this paper. This subject is one that comes almost daily into the practice of the busy operator, and has been almost as thoroughly treated by our writers as any other, and I can hope to say nothing but what has been better said or written before. Every honest dentist practices what he thinks to be the best, and as I *pretend* at least to be honest, I can do no better than give you the practice which has proven the most successful in my hands.

About the removal of pulps, much has been said and written, and many are the ways that have been proposed to do it; the majority are in favor of devitalizing first, a few think best to extirpate it while alive, the latter practice I think too heroic, and in no case do I follow it. There are several agents used to devitalize the pulp, of which I think *arsenic* the best. The easiest and best way to apply it is upon a small pledget of cotton, which is saturated with creasote. Care must be taken in its application, that none should reach outside of the cavity, and come in contact with the gums. It is necessary also to pretty thoroughly remove the decay from the cavity, in order to detect any branch of the cavity that may lead to the gum beneath the surface. Into the merits or demerits of its use I will not enter, others have done so more thoroughly than I could hope to if I should try. The best article upon the use of arsenic that I have seen, is one written by

Dr. C. Stoddard Smith, and read by him before our society at Bloomington, in 1870, in which he answers satisfactorily (to me at least) all the objections to its use that are raised by anti-arsenic men.

The time required for the destruction of the pulp cannot, I think, as a rule, be definitely fixed. Its destruction in different constitutions requires different lengths of time, twenty-four hours will generally suffice, sometimes it will require forty-eight or more. Soon after death, the pulp should be removed, but this is not absolutely necessary, it may remain several days without doing injury, and in its removal I generally consult the convenience of my patient or myself. In the removal of a dead pulp, great care should be exercised that all may be removed. I find this sometimes a difficult and uncertain operation. The best instrument for this operation is the fine broach, though I have seen beautiful instruments made from the common sewing needle, with the temper drawn, and turned at right angles at the point. The pulp cavity must be enlarged, so as to admit the broach as *directly* as possible into the canal, this being done, I would next slowly and carefully push the broach between the pulp and the wall, with the barbed side next the wall, until I could push no further without giving great pain to the patient, or the broach bending, then turn it half round, and remove carefully. If this be done with care, the pulp will generally accompany the broach. I am then quite certain that all the pulp is removed. After the removal of the pulp, in all cases where it is possible, I pass into the canal, as far as I can, a small piece of cotton, the object of which is to prevent the chips from working into the canal, and being crowded through the foramen. I think we have more trouble arising from this cause than we are generally aware of. By the use of the cotton, as described, I fear no trouble from this source. Having passed in the cotton, I would next enlarge the canal. This, sometimes, is a difficult, tedious and uncertain operation, one that generally requires much time, and I am afraid that here we might account for some of our failures. No matter how much inclined, from any cause to hurry through this operation, I think

it wrong to do so. I have never been able to enlarge a pulp canal thoroughly when I did it hurriedly. I think the best instrument for enlarging a pulp canal is the improved Gates. With this instrument, and a well-opened chamber, so as to admit as directly as possible to the canal, and with a goodly amount of care and patience, the canal can be, in most cases, enlarged sufficiently to admit of a thorough filling. After opening the canals, I remove the cotton, and apply a dressing of carbolic acid, or creasote and iodine, which I pump up thoroughly. I let this remain about one week, and if by that time there is no soreness present, I do not hesitate to fill. I have not until recently been able to determine satisfactorily to myself, what is the best material to use in root-filling. I think I have tried every method and article that I have heard of for the purpose, and never have been satisfied until I tried a solution of gutta percha and chloroform. The results I have obtained with this, convinces me that it is the best material I have ever used. It is the only article I have tried that will adhere to the walls of the canal, and will not disintegrate, that I consider the most essential qualification in an article for root filling. As this, to some of us, perhaps, is new, I will describe the best way to use it, as far as I know. A small probe is passed through a small piece of rubber dam, and then passed into the canal, until the patient gives a sign that it has reached as wished. The dam will have been pushed upon the probe, so as to measure exactly the length of crown and canal, remove this, and slip the rubber back toward the point, about one-sixteenth of an inch, slip a small three or four-sided instrument through another piece of dam, the same distance as indicated by the piece on the probe; next wind a broach with a small quantity of cotton, and with it dry out the canal; next, wind cotton around the three or four-sided instrument, and saturate it with the solution, and carefully pass it into the canal as far as indicated by the rubber, press it against the side of the canal, and withdraw the instrument a little and catch the cotton again, and pack it in until the roots are filled, let this remain until it dries; fill the pulp-chamber with Gillois cement, and the rest with gold. We have all of us found

cases, in which from some cause, it is impossible to pass a broach into the canal far enough to remove all the pulp, and you may ask the question—what do you do then? I will say that I can do nothing with any certainty of success; when I have a case of this kind, I remove all the pulp I can, open the canal as thoroughly as possible, dress it several times with some therapeutical agent, and fill as I have described, only, instead of the gold I would use the cement, considering the whole a test filling.

All that I have said upon this subject is but a very brief description of the method I follow in the most common and simple cases, by which I am quite certain of success, but there are many conditions of teeth, both in form and location, as well as many constitutional derangements, that will not, in my hands, admit of a cure, mainly, no doubt, because I do not know the nature of the trouble, or, if knowing, know not what treatment to pursue. In case of alveolar abscess, with a fistulous opening, I would fill as above described, without any preparatory treatment, and feel almost certain that nature would perform the cure. I have not followed this long enough to stand before you and say I *know* it is the best, but I know of several cases where there has been a fistulous opening of long standing that had resisted my best efforts to cure, that were healed in a very short time after the roots were filled with the gutta percha, and have remained so for six months, looking perfectly healthy, and feeling so to the patient. I was in hopes of being able to present to you experiments with different materials for root-filling, with a view of determining which would the best resist disintegration, but from one cause and another, I have not done so; however, I am quite certain from the practice I have had, that gutta percha would prove the best. I am thoroughly convinced that nine out of ten of our alveolar abscesses would be cured by nature if we will only fill the roots of the teeth perfectly, so there shall be no lodgment for pus, which, when lodged, passes back poisonous gases, that keep up a constant irritation and inflammation, and of course a constant discharge of pus; it is not without considerable study and experiment, that I have arrived at these conclusions, yet I frankly say that I know

but little of what there is to be known as regards this subject, and I only consented to write this paper in the hope that it might draw out an argument whereby I could receive more light.

DISCUSSION.

Dr. GLIDDEN, of St. Paul, Minn., stated that he had filled nerve canals for a long time as represented in the paper; uses gutta percha solution, taking care to carry it to the very apex of the root; has not had occasion to refill one treated in this manner during four years; allows the instrument to remain until the chloroform has evaporated before drawing out; with worst cases of abscess filled at first sitting having previously thoroughly cleansed with creasote.

Dr. BLACK, of Jacksonville, Ill., asked Dr. Glidden how he would proceed after removing the debris from the pulp canals of a molar tooth—if pus be discharged through the apices it will usually, within 24 hours' time, re-collect. Wishes to know if such cases would be filled at once.

Dr. GLIDDEN—Yes, sir. Would first wipe it with creasote. Sometimes the pain is acute. If there is a tendency to ulcerate within a few hours, waits.

Dr. BLACK has no doubt that many cases of abscess may get well of themselves, but should not like to subject patients to this excruciating pain; has not tried gutta percha as a root filling in such cases; does not think there is any difference whether it or gold be used. Forcing the pus to form an external opening does not strike him favorably.

Dr. GLIDDEN—How long would you treat such a case?

Dr. BLACK—In any ordinary case should expect to succeed within a week. Wished to allude to another evil result from filling immediately where alveolar abscess is forming. Frequently in such cases a lump arises upon the gum, but owing to

insufficient force to bring it out, it remains stationary sometimes for two or three years, always sore.

As to time for filling roots after removal of pulp, differs from paper. He immediately fills cavities without further cutting, after giving a few minutes for bleeding and saturating with carbolic acid. If pus or blood remain in pulp canals for twenty-four or forty-eight hours, there is more danger of discoloration of tooth than with such treatment. This, his experience teaches him, is the best practice for the health of the tooth.

Dr. O. WILLSON, Aurora, Ill., concurs mainly with paper as to treatment after destruction and removal of pulp. Supposing other parts healthy, forcing creasote up the canals would be injudicious, as, unless abscess has actually formed, active medicines or escharotics should not be forced upon the pericementum. Whichever way the canals are filled, it must be water-tight. Where we have abscess hemmed in by a sack, protecting other parts, or with a fistulous opening, this must be broken up with active remedies. When we have a discharge we must infer that we have an active sack, and generally pus does exude from pulpless teeth. In a recent case could discover no exudation of pus. Patient insisted on filling at once, as there never had been any trouble with the tooth. The very first night after the operation the tooth began to ache terribly. Had the pus been allowed to come down this would have been avoided.

If we can cure chronic and acute abscesses by simply filling the roots with any substance, the millenium for us has nearly arrived and we ought to rejoice. If he could control even periostitis he should feel himself greatly favored; still he did not want to discourage the gentlemen who are so sanguine; but if the truth of their statements can be demonstrated, it would lift a great burden from dental practice, and he would be ever obliged to the man who discovered the proper method.

Dr. DEAN, of Chicago, agrees, in the main, with Drs. Willson and Black; thinks there can be no doubt where a fistulous opening exists; that after creasote, or its equivalent, has been forced

through it, the root may be filled at the first sitting, and the abscess, in most cases, effectually cured. But where there is no such opening, even the filling of the canal with cotton dipped in creasote, and sealing with sandarac, will often produce intolerable pain.

The gentleman from St. Paul does not claim to *cure* abscess by his mode of treatment, but to produce a fistula by closing the root canals, and then let the abscess take care of itself. Should advise the younger members of the profession not to adopt this mode too rashly, as he should be fearful of the results; it was, at least, unsafe practice. On the subject of root-filling, the speaker would not object particularly to the material advocated (Hill's stopping) for this purpose, but seriously condemns the practice of filling without previous treatment. Claimed that the apex could be as easily reached with No. 20 gold foil wound smoothly around a fine root-plugger as with any other material. When the apex of the root has been considerably absorbed, and the foramen enlarged, a small slug of lead, a trifle larger than the canal, introduced and forced down to the end of the root will adapt itself to the walls, and make a good commencement for a filling; the tolerance by the soft tissues of this metal being well known.

Dr. GLIDDEN said it was possible that he may have had failures with this method, but they have not come under his observation. Gutta percha is easier introduced than gold; the latter is apt to lodge in crooked roots before it reaches the apex, but the solution of gutta percha is before the instrument in a semi-fluid state and must fill up any space. He has filled with good success with gold, but with better by this method. Does not force the creasote through the apex, but simply wipes out without pressure.

His nerve-drills have four cutting grooves fashioned similar to Gates', and have guide-points of various lengths and sizes. In a crooked root these instruments are particularly useful. His practice may be dangerous, as the gentleman from Chicago had observed; he was ready to be convinced of this, although he had been successful.

Dr. HOWARD, of Galena, Ill.—This practice strikes every one upon first sight just as it did him, but with it he has certainly had better success than ever before; hopes the young men would not accept Dr. Dean's advice.

Dr. GOBLE, of Dubuque, Ia., has treated five cases in this manner, and after six months they are all a success.

Dr. INGERSOLL, Keokuk, Ia.—We must regard abscess as a new and an abnormal organization as truly as fungus, polypus and tumors, and in order to cure, must thoroughly destroy them by means of escharotics, which, in order to be effectual, must reach every vestige of the sack. He transforms the root into the barrel of a syringe with a smooth opening, fills the enlarged canals with creasote, fits a piece of caoutchouc to serve as a piston, puts a blunt point on this, and forces the fluid through the apex by pressure upon the piston. If he fears that the escharotic has not come in contact with all parts of the sack, repeats until satisfied that it has; then proceeds in due time to fill.

Dr. RICHEY, of Elmwood, Ill.—Where abscess has no fistulous opening, does the gentleman know that his caustic has come in contact with every particle of the sack?

Dr. INGERSOLL.—In such cases a fistulous opening is compelled by compact filling with cotton, saturated with sandarac varnish, or with some other temporary filling.

Dr. DECROW, of Quincy, Ill., uses soft red rubber for piston, first placing rubber dam on tooth before using creasote. If one application is not sufficient, repeats in a week. Has been generally successful. In one case, left superior incisor—a chronic case—made several applications without any beneficial result. The apicial opening was large—no trouble about passing a large broach through it. At one of these injections no fluid came through the external opening, and it was discovered that back of the dam the creasote was running out through a palatal opening. Kept up the treatment, but without success—without any farther discharge, however, through the palatal opening. Finally filled

with os artificial, but the tooth to-day is just where it was a year and a half ago.

Dr. KULP, of Davenport, Iowa, has for several years, especially in front teeth with fistulous openings, filled at once, after being satisfied that the escharotic had reached the entire abscess. Does not do so in bicuspids or molars. The greater difficulty exists where there is no fistulous opening. Believes the most effectual treatment to be the forcing up creasote and iodine and closing in tightly, as this will in a short time produce an opening. He had had several such cases through accident, and succeeded quickest in these cases. If the patient is willing to bear a little pain, gets through with these cases quickest.

Dr. SHATTUCK, of Belle Plain, Iowa, believes the only cure for the case stated by Dr. DeCrow to be extraction, as probably the processes as well as the apex of root are necrosed.

Dr. SMITH, of Burlington, Iowa, thinks that in this case a large portion of the soft and hard tissues have been absorbed by the corrosive action of the pus, and to feed it. When enlarged apices exist from absorption, we may not succeed in our treatment in reaching every particle of the abscess, and it will then keep on spreading until the last vestige of the diseased tissues are destroyed.

He uses a rubber bulb syringe, and if the abscess has exit at more than one opening closes all but one, then injects with powerful pressure upon the bulb, completely flooding the sack. Has succeeded in some cases like the one described. If that tooth had been absorbed at the apex, would extract, smooth off the ragged edges without injury to the pericementum, and would replace the tooth, after having injected such medicines into the socket as the case might indicate.

Dr. BELL, of Chicago, has had good success in the manner of root filling mentioned by Dr. Dean. He made small cylinders of No. 20 gold around a fine point, dipped these in creasote, and filled roots with them, allowing the gold to project a little beyond the

point of the instrument and partially withdrawing the instrument, then carrying back again, thus gradually forcing more gold in the direction of the apex. Does not hesitate to use the creasote in full strength.

Dr. WILSON, of Burlington, Iowa—When the pulp is dead, decomposition soon follows, gases are formed, and an outlet sought. If the nerve-canal is closed, a fistulous opening must necessarily be formed. Forces creasote or carbolic acid through, and fills at once. The greatest difficulty is in cases without these openings. May try the methods advocated, yet his past experience rather prejudices him against it.

Dr. PORTER, Dubuque, Iowa—For the past 18 years has treated abscess by all the various methods. About a year ago had a case that gave him considerable trouble. After having treated and filled the tooth, and removed the filling, there was more trouble than before. The tooth was extracted; a bandage some four or five inches in length was kept in readiness, saturated with the blood from the wound, and tied around the root. The tooth and root was then filled and thrown into tepid water. The end of the root was atrophied; a small portion of apex was cut off. A new flow of blood was then excited, and the tooth replaced in its socket and ligated. The patient was then dismissed for two days. There was no swelling, and the ligatures were removed in six days; and after nearly a year's time it is a success.

Has treated thirteen cases in this manner with entire success. Lost two cases only—a lady 65 years of age, and the other a patient suffering from ague; both lost by neglect and sickness and residing in the country, they could not receive the attention they required. Recommends this as the great desideratum where all other methods fail.

Dr. CROUSE—This discussion is not taking as broad a scope as he had like to see it take. The subject of the paper read does not confine us to treatment of alveolar abscess. He wished to speak of what he considered of as much importance as curing

abscesses, viz.: the treatment of teeth with dead pulps of long standing. Thinks it much better to treat this class of teeth too often rather than not often enough. If they were always treated properly before filling, we should not have so many alveolar abscesses. Uses creasote a number of times, getting to the end of each root if possible, so that every particle of decomposing matter, and the gases arising therefrom, are destroyed. Dr. Glidden's drills are superior to any we have in the depots, which may account, in part, for his success in filling dead and abscessed teeth without previous treatment. Yet the speaker could not agree with this practice. As before said, we must have all decomposition stopped and the root in a healthy condition, before filling, and in case of alveolar abscess, the sack and growth at the end of root must be destroyed. Knows of nothing better to accomplish this than creasote. His plan of getting this through the fistulæ is with India rubber. Makes a piston of it by cutting it something of the shape of the carious cavity, then fills the root with creasote and pumps with the rubber piston, making quick and rapid motions, using some blunt instrument that will not pierce the rubber. Often succeeds in getting the creasote through without enlarging the pulp-canal, but when we cannot succeed without drilling and enlarging the canal, this should be done. He makes a drill for these special cases, filing it very small, so that it is limber a considerable way, then makes a good spring temper, and it works admirably. He much prefers, however, not to drill through and enlarge the opening at apex, and never does it unless he cannot succeed in forcing the creasote through the fistula. Would then close the tooth with temporary filling, if it was likely to be stubborn about getting well, before filling permanently.

Dissolved Hill's stopping is very good to fill certain cases, as where the root is crooked and when it is impossible to fill with gold with any certainty; but in most cases fills with gold after plan suggested by Dr. M. S. Dean—with No. 20 or 30 foil. Thinks in this way roots can be filled, in a majority of cases, better than with any other substance. Next to this, perhaps, comes gutta percha, or Hill's stopping dissolved in chloroform. It has the

advantage of not requiring so much skill or care in its manipulation. The treatment of the case spoken of by Dr. DeCrow, could not be very definitely determined here without an extensive description. We must have all the circumstantial as well as direct evidence. The former habits of the patient should be known. Some constitutional difficulty, perhaps syphilis, is at the bottom of the trouble. It has been recommended to extract and replace the tooth. If every other known remedy has failed, and there is no prospect of nature setting up a healthy action, then it may be allowable to extract the tooth. The practice of extracting and replacing teeth should be the very last resort and only practiced as such. Within the last few years we have been hearing considerable about this plan of treating alveolar abscesses. Had but little faith in it himself. Cares not what is done with the tooth after it is extracted, whether it is scraped, or the ends of roots cut off, soaked in carbolic acid, or kept in tepid water, till the periosteum is restored or made healthy. To make it a general practice is not rational, and does not belong to the nineteenth century.

Dr. WAIDE, of Newton, Ia.—Extracted and replanted a tooth that gave a great deal of trouble three months after filling. It was an entire success after the 9th day.

Dr. PORTER—The gentleman from Chicago misunderstood him. Resorts to this practice only in extreme cases; in all cases uses the fluid extract of buchu after the operation, to prevent soreness and inflammation. The socket should not be washed out with anything, but the clotted blood removed, and by that means a new flow of blood excited an instant before the tooth is reinserted.

Dr. CHASE, St. Louis—These cases of replantation are very interesting, and they are more numerous than we should have supposed.

Some twenty years ago a case of this kind was first reported in the *Dental News Letter.* We know that teeth have been knocked

out and lain in the dirt for two or three days, and after replacement have grown firm, and after recent luxation the circulation has become re-established.

In case of persistent alveolar abscess, he thought every one justified in conquering it by extraction and replantation.

It is astonishing what a tooth will bear. The idea that the periosteum is destroyed by cutting off the apex of the root is all a mistake. It is not at all necessary to keep the tooth in tepid water or blood. Time may be taken for the operation. In some cases it may be well, previous to operating, to take an impression for making a plastic retaining cap or splint upon, to be used after replacement of the tooth. He should treat the next case of a persistent nature that came under his care in this manner.

When there is no external opening in alveolar abscesses, forces creasote up; it causes great pain.

Remembered a case, of two teeth treated in the same mouth, though not at the same time. One had an external opening, the other not. In the case without opening there was more pain than in the other, but it succeeded in a shorter time than the one that had the opening,

In a communication in a recent number of the *London Dental Review*, the author advocates pepsine for dissolving dead portions of pulp. This struck the speaker favorably, and accordingly he had tried it for several months. It accomplished its work within a few hours, provided the pulp has not previously been treated with creasote or tannin.

Dr. Ingersoll—If the abscess is filled with pus it requires more of the escharotic, as the pus will neutralize a portion. Every particle of the sack must come in contact with the agent for its destruction. Treats other than the single-rooted teeth in the same manner. His method is peculiarly adapted to molar teeth. Introduces the creasote upon a loosely wound pledget of cotton, then with the rubber ball pumps it through the roots, and repeats until satisfied that all the abscess has become bathed with the fluid.

Dr. KILBOURNE, of Aurora, Ill., related a case of extraction of a first bicuspid, for incipient ulceration, and replantation. After cleaning root-canals with creasote, and filling with gutta percha, and filling carious cavity with tin, the tooth was replaced and left without ligations, and has been doing well since—about two years ago.

MAY THE CALCIFIC ELEMENTS OF THE DECIDUOUS TEETH BE APPROPRIATED IN THE FORMATION OF ANY PORTION OF THE PERMANENT ONES?

BY M. S. DEAN, CHICAGO.

I propose to show that the lime salts of the deciduous teeth may be (are) used again in the formation of parts of the permanent ones, or in the growth of tissues requiring these materials. I do not claim to be able to prove this by original researches in chemistry or physiology, but only by natural conclusions from well-established physiological facts.

If we take a comprehensive survey of the general features of this subject, simply in the light of common sense, we shall admire the exquisite skill with which the human body is framed. In it we shall find beauty, strength and compactness harmoniously blended; we shall be struck with amazement at the *economy* which manifests itself, everywhere, in the construction and maintenance of each individual part. In the formation of the osseous system, for instance, we shall see lightness combined with inflexibility and strength; and wherever it becomes necessary to use the bones for fulcrums or as attachments for the muscles, their bulk is increased, while their weight and strength still retain their just proportion to the other parts. In short, they are composed of materials so arranged that the least possible quantity of matter will yield the greatest amount of durability and strength.

Then, again, we shall observe that the *supply* of materials that is furnished for the growth and repair of the organs is used with

scrupulous economy. No portion is lost or allowed to go to waste. To guard against this waste of material, the system is traversed by a host of little gleaners—the lymphatics—which gather up from the interstitial parts all the strayed exudations, and carry them into the general circulation; so that nothing which can be assimilated or appropriated by any organ or tissue is permitted to go to waste, or escape from the system as excreted substance, unless there be an excess of these ingredients in the system.

So marvelous do we find the plan of economy, upon which the complex machinery of the various functions of our bodies is carried on, that a cursory examination even of its details must convince the most skeptical that "The hand that made us is divine," and that this divine hand is shown most conspicuously in the ECONOMY of the *forces* and the *materials* employed in the construction and maintenance of the human body.

Now, as a familiar example illustrative of the *economy* with which the system may use the *inorganic* materials introduced in the food, the management and disposition of common salt affords an excellent one. And upon this point I cannot do better than quote the words of Draper, who, I believe, expresses the opinion of physiologists generally upon this subject. He says: "Oxyde of sodium, or soda, is a uniform ingredient of the bile. The hydrochloric acid of the gastric juice, and the soda of the bile, are derived from the same source—common salt—which is either present in the food or purposely added as a condiment. It undergoes decomposition easily, yielding the two products specified, that is, hydrochloric acid and soda, and is readily formed by the union of these two substances. Common salt introduced into the system undergoes decomposition, furnishing hydrochloric acid to the gastric juice and soda to the bile. Considering the large quantity of these secretions produced in a short space of time, it is clear that the drain of common salt must be great—not less than a third of an ounce a day; yet the quantities consumed, at least, are only small. How, then, is this explained? Assuredly, there is no other source from which these bodies can come than

the one indicated—the common salt—and yet it seems to be totally inadequate." He says further: "I think this difficulty is rather imaginary than real. Things are so arranged that a limited quantity of salt can produce unlimited quantities of gastric juice and bile; for the former, associated with the food it has digested, scarcely escapes from the pyloric valve before it encounters the bile and pancreatic juices discharging into the duodenum, and through the length of the upper portion of the small intestines these secretions, together with the food they have acted upon, are brought into complete contact. The reproduction of chloride of sodium is, therefore, constantly taking place in intestinal digestion, and it returns back into the system through the absorbents. Again, it undergoes decomposition, its acid reappearing in the gastric juice, and its alkali in the pancreatic juice and bile. By thus using a small amount over and over again, great effects can be produced, and it is then only necessary to restore those small portions that are wasted in carrying out the general scheme."

Here Draper has given a beautiful illustration of the wonderful economy with which the system may use the *inorganic materials.* Were all the elements introduced in the food incapable of further use after having served one purpose in the system, the body would be overloaded by the mass of materials it would have to carry, to such an extent, perhaps, as to nearly deprive the animal of locomotion.

This faculty—if I may use the expression—of using again and again the same identical ingredients—this power of successive decomposition and recomposition of common salt in the system would seem to solve the mystery which I have been unable, until now, to account for, and that is the thrifty appearance which neat cattle maintain for many months after the external supply of this essential material in nutrition is cut off. Their internal supply is sufficient as long as it is retained in the system. And, on the other hand, the daily escape of a minute portion of this ingredient with the excrements would account also for the subsequent languid and unhealthy condition of these ani-

mals when deprived of a new supply for a greater length of time. Both of these facts have become notorious, that is, that cattle do not seem to suffer in health when deprived of salt for several months; but if this deprivation be continued for a long time, say six to twelve months, the appearance of these animals contrasts very unfavorably with other cattle which are fed the same kind and quantity of food, with the addition of salt.

From this general view of the *providence* and *economy* of nature, it is unlikely, *a priori,* that the rich supply of calcific matter taken from the deciduous teeth should be allowed to escape from the system as waste, especially when the same kind of materials is needed for growth or repair in many parts of the body.

Now let us for a moment examine the nature of the materials removed by the absorbents from the deciduous teeth, and see whether they are capable of being re-employed.

In the first place, they are living materials, in one sense at least, although Beale calls all "formed material" dead material. But I shall apply the term *living* material to the ingredients of teeth in which the pulp is not devitalized, to contradistinguish it from the constituents of teeth in which the pulp is dead.

These materials, in the deciduous teeth, are not absorbed *on account* of their degeneration; they are not taken away by these vessels *because* they have become disintegrated, and thereby rendered less capable of performing their functions in the tissues or organs of which they are constituent parts, than they were *before* the absorbents seized upon them and dissolved their combinations. But these materials—these teeth—are taken out of the way, because they are a physical obstacle that must be removed, in order to give room for their stronger and more enduring successors.

The removal of these materials is the result of physiological or vital action, and is not a pathological nor chemical process. If it were the latter (chemical action) the pulpless or dead teeth might also be removed by the same process. The dead teeth, though they yield as readily to the action of chemical agents as do the living ones, resist effectually and totally the absorbent forces of the papillae. These materials, then, are living undege-

nerate matter, taken up by vital or physiological forces, and carried into the circulation, and there can be no reason whatever for supposing they have become unfit pabulum for other tissues. Some may contend that the lime salts taken from these teeth have lost their connection with the organic matter, with which they have been intimately associated, and for this reason, cannot be appropriated by the tissues. They may take the ground that the phosphates have become disorganized, so to speak, and that these identical ingredients cannot be again assimilated until they have become re-organized, as it were, in the vegetable form, and in that form enter the system again. This objection to the use of the calcareous elements of the deciduous teeth is, I think, utterly groundless, even if they had lost their intimate union with organic matter; for it is altogether probable that the crude phosphates may form this connection with organic matter *within the system.* But if we grant that this combination cannot be effected internally, it by no means proves that these calcific elements cannot be appropriated by the tissues, for all the authorities I have noticed upon this point agree that the phosphates leave the body in the same form in which they enter it in the vegetable food. If this be the case, the objection to the re-appropriation of these materials, on account of the disintegration of the organic matrix, or their separation from organic matter in which they have been held, is without a shadow of foundation.

That this waste of the lime salts of the deciduous teeth would be contrary to the economy of nature, I think I have already shown; and that it is contrary to other analagous processes in nutrition, I think I shall be able to furnish sufficient evidence.

The opinion of physiologists generally, is by no means adverse to this view. Lionel S. Beale says:—"In the formation of muscle, for instance, from lifeless nutrient pabulum in the blood, the matter which is to become muscle passes through these different conditions:

"1. That of soluble nutrient matter, or pabulum.

"2. Germinal matter, nucleus.

"3. Imperfectly developed, formed material.

"4. Fully developed, formed material, muscular contractile tissue.

"5. Disintegrated formed material, which becomes slowly reduced to a soluble state, and is converted, by oxydation into new substances, some of which pass away, while others in their turn become pabulum for other kinds of germinal matter, such as the white blood corpuscles and the lymph corpuscles."

Here Beale makes the direct statement that some of the disintegrated muscle tissue may be used again as pabulum for germinal matter. And as far as his authority goes—and I believe there is none greater—the question is already settled that materials which have been used in the formation of one tissue may be afterwards appropriated by others. Dunglinson, Carpenter, Dalton, Flint and Paget, as far as their testimony goes, it is indirectly confirmatory of this statement of Beale, though they are more reticent on this point than Draper, who iterates the same sentiment in these words:—"The constitution of the urine proves that the amount of muscular fibrin destroyed in short periods of time is very great. We cannot estimate the hourly consumption at less than 62 grains. Such a waste must demand an equivalent compensation, if the animal mechanism is to be kept unimpaired, and every care is therefore taken to omit no means which may incidentally offer for husbanding the necessary materials. The action of the lymphatics illustrates this principle significantly. Passing through all the soft solids, where exudation of albumen from the blood-vessels can take place, they collect the materials that would otherwise go to waste, and add thereto many of the products arising from disintegration and decay of the soft parts themselves."

In regard to the development and maintenance of the adipose and osseous tissues, he says: "From the phenomena of nutrition generally, we may conclude that there are several sources from which *materials* for these purposes may be derived; a part may be obtained directly from the food; a part may be manu-

factured or fabricated in the system itself, or *may be taken from some locality therein*, in which it has become redundant or useless, and transferred elsewhere to the point at which it is required."

Again, he says :— "In the adult the sources of bone-earth are two-fold; in part it is derived from the food, and in part from the re-modeling and changes of the bones themselves."

The same author makes the following clinching statement, which, if possible, is still more to the point :—"As to the sources from which phosphate of lime are derived, though doubtless the food offers it in considerable quantity, there are many reasons for inferring that the identical portion which has been removed from one part, is used for the extension of another; and thus we may say that there is a plastic operation continually going forward, a re-modeling, so as to adapt the structure to its new conditions if in a growing animal, or to maintain it in good repair if in an adult."

These statements of Beale and Draper, if worthy of credence, are sufficient analogical evidence to satisfy me that the calcific elements of the deciduous teeth may be appropriated in building up portions of the permanent teeth, or any of the other tissues of the body that require calcareous elements.

So also Liebig—"It is obvious that the phosphoric acid which in consequence of the metamorphosis of tissues is produced in the form of soluble alkaline phosphates must re-enter the circulation of this class of animals (the graminivora). It is then employed in forming brain and nervous matter, to which it is essential, and also, no doubt, in contributing to the supply of the earthy part of the bones. In the graminivora, therefore, whose food contains so small a portion of phosphates, the organism collects all the soluble phosphates produced by the metamorphosis of tissues, and employs them for the development of the bones and the phosphorised constituents of the brain; the organs of excretion do not separate these salts from the blood."

We have seen from the foregoing—

That the process of nutrition is carried on in an exceedingly

prudent and economical manner; that the elements taken from the deciduous teeth by the absorbents are not degenerated materials, nor unfit pabulum for other tissues; that the inorganic substance—common salt—may be used over and over again, subserving an important purpose in nutrition, until it is gradually lost with the excrementitious matters; we have seen that portions of the disintegrated muscles, which are composed almost entirely of organic matter, may be converted into pabulum for other tissues; that the same identical phosphates may be used indefinitely by animals whose food is deficient in this essential ingredient; and finally—which is still more significant—we have seen that these lime salts, of the deciduous teeth, are taken into the circulation at the period of life when these elements are the most imperatively demanded in the *growth* of the young animal.

If these positions have been maintained, we have an abundance of analogical evidence to conclude that the calcific elements of the deciduous teeth may be, and are, appropriated by the incomplete parts of the permanent teeth, or by any other tissue which may require these constituents as pabulum.

DISCUSSION.

Dr. Black, Jacksonville, Ill., wishes to call attention to one point—that is, non-absorption of the roots of deciduous teeth with dead pulps. It is often very difficult to determine how far absorption had progressed before the pulp died, but he believes that absorption is not prevented by loss of vitality, but by diseased conditions of the membranes investing the root. If these membranes remained healthy, absorption would progress. Could not see that such matter removed from dead teeth would take any other channel.

Dr. Judd, St. Louis—Every one who has listened to the reading of this paper is doubtless convinced that the argumentation

is sufficient to establish the doctrine that certain portions of broken-down tissues are reappropriated for nutritious purposes by the system. Were it necessary we might, however, adduce in favor of this proposition one or two other reasons which point in the same direction. The lymph, which is doubtless a product of tissue disintegration, passes from the capillary lymphatics into the thoracic ducts, and thence into the subclavian veins and on to the right side of the heart, from which it is sent with the venous blood to the lungs, to be oxygenated and prepared for performing its nutritious functions. Now, if it were useless, and intended only to be excreted, would it not have been poured into the arterial system and carried directly to the excretory organs, which would eliminate it from the system?

Dr. CHASE, St. Louis—If nature is so economical in the use of her materials, why don't she use them in starvation? A certain loss of all tissues goes on when food is not taken into the system, so that if new food is not given, death is the result. Why don't she keep the person alive? An ounce of the salts of lime and soda is daily thrown out by the urine alone. Why don't she keep it in the system?

Doubts not the elements of the deciduous teeth, the living lime salts, may be reappropriated, but is it *necessary* for them to be so reappropriated? We find plenty of the lime salts in the food, and especially in the cereals.

Dr. SANBORN, Tabor, Iowa—We eat and drink for the purpose of replacing broken down tissue. When tissues have subserved the purpose for which they were assimilated, they are disintegrated, and are no longer capable of reassimilation.

Disintegrated tissues are reabsorbed, and are removed from the blood through the emunctories—the lower bowels, kidneys, liver, lungs, and skin. Dead matter, as a dead tooth or necrosed bone, is removed by a process we call ulceration.

There is a difference in the process of tearing down deciduous teeth. The roots of healthy deciduous teeth are not disintegrated to be removed as broken-down tissue, but are absorbed and again

used; but if they are dead they are treated as dead matter, which is poisonous to the system, and instead of being absorbed and removed, as ordinary disintegrated tissue, they are refused a passage through the system, and are removed from it directly by ulceration. In starvation, disintegration goes on, but assimilation does not take place. The vital powers can use only substances of organic matter to build up tissue; when the tissues are worn out, their matter bears the same relationship to vitality as dead or inorganic matter.

ANATOMY AND HISTOLOGY OF THE TEETH, AND THE INFLUENCE OF CERTAIN AGENTS UPON THE DENTAL TISSUES.

BY I. P. WILSON, BURLINGTON, IOWA.

As we look upon organized bodies, and admire the beauty and elegance of their formation, our eyes are delighted with their symmetrical appearance, and our hearts filled with wonder as we contemplate the wisdom displayed by the great Designer. And when we behold the human form, we are led to exclaim that "Man is fearfully and wonderfully made." But when we separate bodies into their elements, and examine more minutely their structural formation, we see still greater beauty, and the subject becomes one of deeper interest. The exterior may lend enchantment to the eye, but when we use the power of the microscope to aid the eye in discovering the elementary formation, there must be an intensified interest felt by the inquiring mind.

As we examine the hard tissues of the dental organs with the unaided eye, we discover three distinct structures—the dentine, the enamel, and the cementum. The dentine forms the body of the teeth, the enamel invests the crown, or that part of the dentine above the free margins of the gums, the cementum covers the roots, or that part of the dentine imbedded in the alveolar process. Take either one of these anatomical parts, and it presents to the naked eye a structureless appearance, and it is only by the aid of the microscope and chemical analysis that we are enabled to examine satisfactorily the constituent parts or elements that enter into the formation of these organs.

It is not my purpose in this paper to describe minutely the elementary formation of the teeth, for in doing so I should have to quote from different authors that which all of you have read, or may have the privilege of reading, for yourselves.

It is not enough that we should be familiar with the classification of the teeth and be able to describe the forms of the different classes; neither should we be content to know, simply, their anatomical relations, but by the aid of the microscope, and the chemist, it is our privilege to thoroughly acquaint ourselves with the histological elements of these organs. We may even go back to cell formation, and study the first principles of germination, and observe the gradual development and formation of tissues until they combine and form the perfect organ.

The structural formation of the dentine, enamel and cementum are in some respects similar, while in other respects they are quite dissimilar.

There is quite an intimate relationship existing between dentine and true bone. The most striking analogy is shown by the existence of Haversian canals in both, and the matter entering into their composition is also quite similar.

An examination of dentine under the microscope shows but two elements, the solid and perfectly structureless substance, and the dentinal tubuli.

The dentine is largely composed of phosphate of lime, there being about 65 per cent. of this salt found in its composition.

The enamel is the hardest substance found in the human body, and can scarcely be cut except with a fine steel instrument, and then sparks are sometimes thrown off like those from a smitten flint.

Enamel consists entirely of solid prisms, irregular in shape, but commonly hexagonal, the length of the prisms determining the thickness of the enamel—one end resting on the dentine, the other coming in contact with an exceedingly thin membrane, or cuticle, covering the enamel. Dry enamel contains from 81 to 88 per cent. of the phosphate of lime. In teeth not fully developed, and even those several years of age, the enamel may not be

firm, and in many instances can be cut quite readily, and owing to this immature condition they are more liable to be attacked by caries than in subsequent years; hence it is that the third molars decay more readily at the time, and soon after their eruption, than they do after becoming fully matured.

It follows that the permanent teeth should be more fully cared for in their immature state than at any other period.

The cementum is the softest of the three structures, and is composed of true osseous tissue. Like bone, the cement consists of *matrix* and of *lacunæ*, and it sometimes contains Haversian rods. Its internal surface is so intimately united with the dentine and yet without any intervening or connecting substance; indeed, the limits of the two structures are not sharply defined. Having simply called attention to the histological elements of the teeth, without entering into detail, or describing minutely their structural formation, we pass to notice the effects that certain agents may have upon the dental tissues, should we thoughtlessly, or otherwise improperly, employ their use.

The dentinal tubuli, which form a complete network throughout the entire dentine, should not be exposed to arsenic, when applied to destroy the pulp, and to avoid this, extraneous matter should not be removed from the walls of a decayed tooth, until after the arsenic has been employed and the pulp destroyed; otherwise the dentine will become thoroughly impregnated with the poison, and unpleasant results may follow.

After the pulp is removed, the nerve vessels sometimes bleed quite freely; and if the walls of the cavity, with its exposed tubuli, are bathed in blood, and confined there by a temporary filling for a few days, the tooth will become much more discolored. A sandarac plug not only makes a temporarily water-proof filling, but it forms a coating over the walls of the cavity, thereby closing up, to some extent, the ends of the tubuli when, at a future time, these tubes are effectually closed by deposits of the lime salts.

Instruments are sometimes broken off in the roots of teeth, and if deoxidizing agents are used in after-treatment, the steel is decomposed, and taken up into the tubuli, and circulated through-

out the dentine, thus giving the tooth a dark, ink-like appearance.

It is claimed by some that amalgam may be driven with such force into a cavity as to cause the minute globules of mercury to insinuate themselves into the freshly-exposed tubuli, thus creating inflammation of the dentine, and ultimately destroying the vitality of the tooth. The pernicious influences of the agents above named upon the dental tissues must be apparent to all, and without enlarging upon the points hinted at, we will conclude by calling attention to the importance of furnishing suitable nourishment, as repairing material to build up the broken-down tissues of these organs. We are too apt to lose sight of the fact that the elements entering into the formation of the entire system are changing—ever changing; that good dental organs to-day does not necessarily imply good teeth for the next year.

The young maiden who, to-day, with sparkling eyes and radiant brow, and with the rose-bloom of health upon her cheek, stands before you in all her vigor and strength, may appear before you ere long with an infant in her arms and an anxious husband at her side, and you exclaim, "What a change!" The sparkling eye has grown dim, the blooming cheek has faded, and the emaciated form now totters before you. Examine the dental organs, and you find them in sympathy with the impoverished body. Why all this change?—where those sparkling eyes? and the infant raises the little windows of its soul to meet your gaze, and its dancing eyes give you the answer. Where the roses that bloomed upon that maiden's cheeks? and the little cherub's dimpled chin and its blossoming cheeks give the response. Where will be the identical tissues that form these bodies of ours to-day, twenty years hence? Science proves to us that they will all exist. Some, perhaps, will enter into the formation of vegetation, and furnish food for the ox in the meadow. Some of these broken-down tissues may enter into the formation of the rose, and be worn on the bosom of fashion. The fruit of the vine, and the grain of the field may claim their portion, and may again be taken into our systems as nourishment; and thus through long ages,

without the annihilation of a single atom, the tissues now forming these bodies of ours will exist in some form or other while time shall last.

Let us draw our conclusions. The human body is composed of certain elements. All those elements may be found in proper food; and as one tissue after another gives way, our food must furnish the blood with certain repairing material, or poverty of the tissues must follow.

Let our aliment contain those elements that are daily wasting away, and we will possess more healthful and vigorous organisms.

DISCUSSION.

Dr. C. Stoddard Smith, of Springfield, Ill., does not believe that arsenic effects any change in the tooth tissue; there is no difference in the result, whether the pulp is devitalized by arsenic, or by the ordinary process of inflammation.

Dr. Swain, of Chicago—How does arsenic produce death of the pulp?

Dr. Smith—It does it by its power of inducing an inflammation of the part to which it is applied. It is an escharotic in some degree, and in this case its action is merely local; the *constitutional* effect of arsenic applied either to an excoriated surface or directly to the stomach, is found to be to produce an inflammation of the coats of the stomach; but no arsenic enters the circulation even of the pulp so long as the application is kept inside the tooth. Arsenic is a preserver of tissues; and some experiments were made by Professor Flagg, of Philadelphia, which proved that an ordinary arsenical application would perfectly preserve a large frog, converting it into a perfect mummy. We know well enough that pulps of teeth treated with arsenic are not mummified, but, on the contrary, putrify and produce abscess. Dr. Flagg also tested about one hundred pulps, which

were removed entire, and in the majority of cases not even a trace of arsenic was found, and in those in which a slight trace was found, it was only an amount which probably adhered to the outside of the pulp. For these reasons it is believed that no arsenic enters the circulation of the pulp, much less of the surrounding tissues.

Dr. JUDD, St. Louis, would much prefer that others, who are excellent chemists, would speak upon this point; the question is whether the pulp is destroyed by the absorption of the arsenic or by inflammatory action engendered by it. He has been led to believe that exceedingly small quantities of arsenic are absorbed, because when only a very small point of the horn of the pulp is exposed, and arsenic employed, the tooth extracted in a few hours afterwards and broken open, we find the entire pulp congested. A hot iron would not produce congestion to this extent. Irritants, or caustics will produce sloughing, and the tissues will afterwards heal up, and hence, he believes a small quantity of arsenic must be absorbed and carried into the circulation of the pulp.

Prof. PECK, of the Medical Faculty of the Iowa University, was invited to the floor. He said: Dentistry is a part of surgery which he respects, but of which he is entirely ignorant. He came to listen, and not to speak.

A great change has taken place in medical practice. It used to be supposed that the pus, in cases of abscess, and in other suppurations, was in the system, and must be gotten rid of, but we have learned through the investigations of Von Recklinghausen and Cohnheim that the pus corpuscle is only a white blood corpuscle, and that it comes from the blood, so our ideas in relation to the necessity of its expulsion from the system has changed, and we now find that it is better in some cases to endeavor to produce absorption of pus, even after an abscess has formed, &c.

[Prof. Peck spoke considerably at length, but as his voice was

unfamiliar to the reporter, and most of his remarks entirely inaudible at the reporters' table, only a very meagre portion was obtained.]

Dr. JUDD—That arsenic taken into the stomach is absorbed, was observed by Orfila many years ago, if this is true, what reason have we to suppose that it cannot be taken up by the veins of the dental pulp?

As Professor Peck has stated, the opinions and practices of the profession have greatly changed in consequence of the investigations of Von Recklinghausen, Cohnheim, Stricker and others, and although there be no necessity of expelling pus from the system, in the sense in which it was formerly argued and practiced, still it is probably best in many cases to evacuate the contents of an abscess, rather than to depend upon its absorption. Had a case of abscess at the apex of root, in which he made every effort to break it up, finally stopped up the canal of the tooth, while the pus formation was going on; supposed after a little time there would be a fistulous opening, this did not occur, but the absorption of the pus was complete. We must bear in mind, however, that although pus corpuscle, and white blood corpuscles may be said to be identical; still it would perhaps be better to say that the pus corpuscle was a descendant of the white corpuscle of the blood, though perhaps we shall be unable to determine satisfactorily where the line of distinction between the two should be drawn. Paget, arbitrarily, as it is thought by some, fixes the distinguishing characteristic in the commencement of a fatty degeneration of the white blood corpuscle, after which he considers it a pus corpuscle. That there must be a difference is evident from the fact that the white blood corpuscle is capable of being wrought out into the elements of tissues, but we have no evidence to show that the pus corpuscle is capable of being organized into any kind of tissue, though it is probable that they are capable of self-multiplication. These theories of Paget's do not seem to be endorsed by Billroth or Rindfleisch, who are undoubtedly first-class authority upon this and kindred subjects. Pus

may be absorbed in two ways, one where the pus corpuscles are broken down and dissolved by a fatty degeneration; and it is now also well-established that the wandering cells or white blood corpuscles, which have escaped from the blood-vessels into the connective tissues, may return again to the vessels through the medium of the lymphatics, the capillaries of which have been shown to have direct communication with the lymph tracts which are found among the connecting tissue fibres.

Dr. KULP, of Davenport, thought arsenic applied to pulps of teeth was absorbed sometimes. In cases of large exposure, after the application of arsenic, has had patients complain of peculiar symptoms of general sickness, a feeling of lassitude, &c., similar to the symptoms produced by constitutional administration. He is, therefore, inclined to the opinion that it is absorbed.

Prof. PECK wished to ask Professor Judd if, in dental practice, the aspiration had been used in cases of abscess, and if special attention had been paid to the influence exerted in pathological conditions by parasites.

Dr. JUDD—The abscesses connected with the fangs of teeth, which include a large majority of all that the dentist is called upon to treat, are generally small, and are usually easily cured by evacuating the pus and disinfecting by means of creasote or carbolic acid. The aspirator has not to my knowledge been resorted to for drawing off the purulent matter, but the use of carbolic acid was extensively used for disinfecting abscesses, long before Lister promulgated his theory of the treatment of wounds with this agent, though we must perhaps admit that for the most part the practice was empirical, though the philosophy of the treatment now seems to be pretty well understood. He would remark, however, that occasionally abscesses which are usually taken for alveolar abscesses are met with, which are obstinate and exceedingly difficult to cure. He thought these cases differed from the common alveolar abscesses in this:—that in the latter there was a complete sack surrounding the apex of the fang, and extending

to the external fistulous opening, and that the pus was confined to the cavity of this enclosing sack, but in the obstinate variety, the sack had at some point been broken down, and the pus came in direct contact with the surrounding tissues, and usually there was caries of the alveolar processes, and sometimes also of the body of the maxillary bones, as a consequence of the purulent infiltration.

Dr. MORRISON, St. Louis, believes it true that after the administration of arsenic, it is traceable throughout the blood, but the coating of the stomach is principally affected; and in pulps of teeth the outer surface may be most affected, yet it may go beyond the roots. The walls of the veins are broken down, and a general state of congestion prevails.

CONTOUR FILLINGS.

BY K. B. DAVIS, PETERSBURG, ILL.

Perhaps no subject has been so frequently written upon and discussed, either directly or indirectly, by dental societies, as that of filling teeth, and it will ever continue to be a prolific theme for discussion so long as there are to be found in our ranks so many poor and indifferent operators; and so long as the law tolerates and the public supports and encourages, these uneducated and indifferent operators, there will be ample room for discussion upon this important subject.

But it is not our purpose to speak of filling teeth in general, but to call your attention to that class of operations known as contour-fillings.

Before the invention of the rubber dam, mallet, and other indispensible requisites to perfection in filling, these operations were seldom attempted, in consequence of the great difficulty of thorough protection against moisture that is so essential in this class of fillings; but with our present facilities for protecting cavities from moisture, these operations are easily performed by any good operator, and with every prospect of permanent value and service to the patient.

I presume there are but few first-class operators who do not insert contour fillings whenever they are indicated; but there is a very large class in our profession who, from their inability, indifference or indolence, habitually sacrifice those teeth that need contour fillings, or else insert some cheap filling, in such a way as to very poorly preserve the masticating surfaces of the teeth.

The most important functions of the teeth are mastication, to aid in the enunciation of words, and to preserve the natural expression of the face. To preserve the utility of each defective organ, it should be operated upon in such a manner as to preserve as nearly as possible the purposes for which it was designed —the teeth being fashioned by nature upon the most desirable plan for the performance of their proper functions. Then it becomes the duty of every operator to restore all lost or broken parts of the crowns of all the teeth, in order that they fill as perfectly as possible the functions designed to be performed by them. Nature never gave to any one a greater masticating surface than was designed for use, nor more than is necessary to equalize the process of digestion with the other organs whose functions follow that of mastication.

From the above considerations, contour fillings are clearly indicated—1st. In all broken-down molars and bicuspids, in order to preserve their original masticating surface; 2nd. In all of the anterior teeth, in order to preserve the facial expression, and to aid in the articulation of words.

I am well aware that many seriously object to these fillings in the incisors, and deride them as fancy operations, advertisements, jewelry work, &c., &c.; but permit me to ask if it is not our imperative duty to perform the operation that promises the greatest amount of utility and permanent benefit to our patients? Again I would ask, are these operations any more or nearly so unsightly as would be the loss of tooth substance if you resort to flat or plain filling? Nor is it more unsightly to me than the distorted features produced by a poorly adapted and arranged set of artificial teeth that promise so little in point of utility in mastication or elegance of expression.

Gold is the only material from which satisfactory results can be obtained in contour fillings; but from what particular preparation the best results are attainable I do not pretend to say, some operators preferring sponge gold, while perhaps a large majority prefer foil. Perfect fillings are made from each of these prepara-

tions of gold. Each operator should use that kind of gold which his experience has taught him will secure the best results.

In the insertion of ordinary fillings great care is very essential to success; but in contour operations the utmost thoroughness in every step of the operation is particularly requisite to anything like permanent success. Suppose that an upper central incisor is to be operated upon for a contour filling. In the first place, I would file the irregular edges of the cavity to a strong and regular margin, until it is strong enough to form a good wall for the cavity. Then I would excavate all unsound dentine, taking care, however, not to sacrifice more of the sound tissue than would be absolutely necessary to secure the retention of the filling. Having removed all decayed dentine, and the cavity shaped as desired, I would next drill my retaining points, if the filling is to be started and anchored in this way. But if sufficient anchorage could not be secured in the usual way, then I would insert a sufficient number of gold screws in such directions as would secure the greatest amount of strength to the filling when completed. Before commencing the filling, the margin should be polished with a very fine file or polishing-stone, in order that the gold may be thoroughly adapted to the same. The rubber dam being applied, we are now ready to commence introducing the gold.

For filling this cavity, I would use No. 30 or 40 foil, well annealed. The pluggers should be small points and delicately serrated. First filling up the retaining points as solidly as can be, we condense thoroughly each piece of gold before adding another. This filling will require a long time to complete, but we must not get in a hurry. Thus continuing until the cavity is full, we then commence extending the gold over the cervical margin, building up on the filling towards the walls of the cavity, from without and within, all the time. The force should be directed at an angle upwards against the plug, in every direction looking toward its surface. If this is done, we will finish condensing the gold at the mesial corner of the filling. Having finished the introduction of the gold, nothing now remains but to finish up the plug. With our burring engine, files, polishing

powder, and tape, we will finish up this filling; and if the gold was thoroughly consolidated by finely serrated and delicate points (such as Judd's or Varney's), this filling will have no pits, but will be a "thing of beauty," and if not a "joy forever," at least we trust it will be of great service to the patient for a long time.

When applied to for very large and difficult contour fillings, perhaps we are all strongly tempted to resist filling, and try to persuade ourselves that we will be doing our duty by advising extraction. We know that such fillings are exceedingly tedious, taxing both physical and mental powers almost beyond endurance; and thus we try to induce the conviction in our minds that we are under no moral nor professional obligations to save such teeth when they can be extracted with so much ease to ourselves. Can we, in this way, satisfy the increasing demands of an enlightened public upon our profession? Can we, with our present facilities for filling teeth, conscientiously perform our duty to ourselves, to our patients, and to our profession, by refusing to save every tooth that it is possible to render useful?

Then we may lay it down as a general rule, that with all teeth that present the appearance of a reasonable hope of success, an attempt should be made to save them, and the original shape of the tooth should be as fully restored as possible.

DISCUSSION.

Dr. De Crow, of Quincy, Ill., said in too many cases these operations are not as permanent as they should be, and wished to know why this was.

Dr. O. Willson, of Aurora, Ill., said he had hoped that some gentleman familiar with the use of screws as helps in restoring the contour of teeth, would demonstrate their views in our clinics, for it is true, as a general proposition, as just suggested, that where much gold lays outside the margins of the cavity, success

is the exception. Nothing but very favorable conditions has made it otherwise, at least until the screw was revived. Indeed, so many have been the unfavorable conditions that many practitioners have abandoned general restoration, in full. A venerable practitioner, as widely known, perhaps, as any, told him recently that he had abandoned it as a rule.

But the question is a too important one to be at all neglected. Those of you who have the largest observation upon the subject of absorption of the alveoli can but shudder at the thought of losing the natural teeth, and can but hail with delight anything that will avert the necessity of a plate. Dr. Swain will tell us of the pivot tooth—second to nothing (when properly handled) except contour work; if that can be made strong enough, second, simply because of the pulpless root. With the screws, the vast majority of the unfavorable conditions vanish, and with the balance let us contend.

Dr. Honsinger, of Chicago, objects to demonstration of the screws, because he was not interested in the patent (laughter). There is a question as to the advantages of screws; he believes that in incisors and molars, they are advantageous, but not so in the bicuspids. The thread of the screws ought to be coarser than those sold as Mack's screws, and after having drilled the hole, it ought not to be tapped.

Dr. Kulp, Davenport, Ia., said it was impossible to make a solid contour filling without the aid of the rubber dam, and in these cases it was particularly essential that the flaps of the rubber should remain fixed, out of the way of the operator, so that he might give his entire time and attention to the operation proper. He then exhibited a new dam-holder, the invention and donation to the profession of Dr. Magill, of Rock Island, Ill, and demonstrated its use.

Dr. Black, of Jacksonville, Ill., regards screws as of great importance, the obtaining of the patent has been beneficial to the profession, as it has directed general attention to the matter,

although he, as well as Dr. Honsinger, had used screws for that purpose, long before the patent was ever issued.

To test the retaining power of these screws, he screwed one into the dentine of an extracted tooth, and built gold around it, it took quite a severe blow to detach the gold from the tooth, much more so than with ordinary retaining pits.

He built up a lateral incisor, worn down by abrasion to the gums, without excavating at all, simply put in four screws and built to them on square surface—after seven months of rough usage, it remains a success. In the insertion of these screws, care is necessary, the tap is too large for the screws—though cut by the same plate—as gold, being softer, will cut smaller, and still expands while tempering. The thread of the screws should be larger.

Dr. Kitchen, of Galva, Ill., hoped that something would be said in regard to forming contour fillings in bicuspids, with a view of keeping them permanently separated.

Dr. Dyer, Chicago—When Dr. Black relies upon screws alone for retention of his fillings, these being denser than the filling, would not their greater expansion lift the filling from the dentine?

Dr. Black, theoretically, yes; but it is not shown in practical working.

Dr. Chase, St. Louis—Mack's screw taps are useless. He drills holes corresponding in size to screws, minus their thread, and screws into the dentine, this makes firm work. The kind of gold used makes not much difference. Has used Kearsing's prepared blocks; No. 60; Williams' cylinders, as high as No. 2 may be used in large fillings; uses Kearsing's and Pack's blocks almost entirely.

If care is taken in condensing the gold and preparation of cavities, does not think failures need occur, does not know of but one failure in his own practice within the last five or six years; mallets in the direction of the apex of the root in all contour fillings.

Dr. Crouse, Chicago—This is a subject that must not be ignored; is as much in favor of contour fillings as any one, when it does not interfere with free separations, so that all particles of food can be removed. One of the chief objections to restoring the broken crowns to their original shape is that it brings them together so that food lodges between them, and from the difficulty of removal, it is left there, and will destroy the best of operations many times. To restore crowns to their original shape, endangers the part most likely to fail, viz.: the cervical margins. The same influences which destroyed these crowns will be at work, and in the majority of cases, will cause failure in course of time.

Besides, the difficulty of dressing the gold down perfectly, so that none overlaps at the cervical margins, is another objection to having them so contour; for if the gold is allowed to overlap, the best condensed fillings will sometimes be destroyed from this cause. Hence, his plan, when the objection spoken of exists, is to make separations sufficient to insure cleanliness.

Another cause of failure is a want of thoroughness, first in the preparation, securing good anchorage, and cutting away the parts which are likely to break down; then, in filling every step must be thoroughly taken. One must have system as well as thoroughness, throughout the entire operation. Many times the mind and body are taxed to their utmost, and the operation is left incomplete. If all is done properly, crowns can be restored, to be of great benefit, and, as was urged by the essayist, more should be done in this direction.

Dr. Kilbourne, of Aurora, Ill.—Discrimination is necessary as to how and when to make contour fillings, and proper care on the part of the patient is essential to keep them in order. Teeth should be so shaped as to be self-cleansing, but he thought cutting away half of a tooth was preferable in some cases to allowing the teeth to crowd together, so that they cannot be cleansed.

Dr. Kulp, of Davenport—If walls of bicuspids are broken down, cuts away freely to solid, safe substance, separates by means of cotton wedges; restores the grinding surfaces so as to

allow ample space for finishing, and for cleaning afterwards, this he considers especially important in bicuspids and molars.

Dr. DAVIS, of Petersburg, Ill.—This subject is a very important one to us as well as to our patients. We read much about the injury from plates, and if we would do more contour filling, much of this would be avoided. We should always recommend that which is best for our patients, and it certainly is our duty to restore as much as possible of every tooth. In doing this, every step of the operation should be done with the utmost thoroughness, instruction to the patient as to proper care of the teeth after filling, is essential for its success.

THE PART WHICH VITAL ACTION PLAYS IN THE HISTORY OF DENTAL CARIES.

BY DR. H. S. CHASE, ST. LOUIS.

The various theories in regard to the kind or kinds of action which constitute dental caries, have probably more or less of truth in them all. That the process which produces that disintegration of the dental tissues which is usually called by the name of dental caries is wholly chemical, or wholly vital, I do not believe. Neither do I think that there is sufficient evidence that fungi assist materially in its development and progress. The great number of observations which have been made in regard to the action which acids have in the disintegration of the dental tissues have well established the fact that the destruction of tooth-substance is mainly produced by chemical decomposition.

I think that the greater number of the members of the dental profession believe that chemical decomposition is the *sole* process in the history of dental decay or dental caries.

Formerly vital action had greater consideration in the production of this disease than it has at the present time; and it is my object in this paper to present a few thoughts in favor of the vital movements which I believe undoubtedly play an important part in the progress of dental disintegration, and to give to those vital movements a place in the history of this disease which I believe they deserve.

Many persons assume that all vital movements cease in the dentine and cementum when those tissues are fully formed. A

still larger number declare that there is no vital action whatever in the enamel substance when *that* is fully formed. I believe that observation will establish facts that will prove these assumptions to be false.

Admitted facts prove that vital processes are the sole cause of the production and completion of all the hard tissues of the teeth. And the history of the shedding of the temporary or milk teeth prove that it is vital action alone which removes the roots and whole body of the dentinal crown. It is easily seen, then, that it is a living movement that builds up the tooth structure to its highest perfection, and also as patent that it is the same process, in a different direction, that takes down, particle by particle, or cell by cell, that same edifice which was so beautifully erected.

Microscopical observations have proven that a barrier of defense is often interposed between a cavity of decay and the dental pulp by an increased calcification of the dentine at that particular location, resulting in an increased hardness and density of the dentine. Here is a vital process again; and this action takes place in the teeth of the middle-aged, as well as in those of the young.

Again, in cases of mechanical abrasion, where the teeth are worn down below the thickness of the enamel, we often find the surface of the dentine almost as hard and polished as the enamel itself; and this density of the dentine does not extend to a great depth, but, on the contrary, is generally limited to a thin shell of that portion of dentine which is liable to the destructive abrasion, looking very much as though the tooth was endeavoring to protect itself by packing its tubuli with calciferous matter, and thereby forming a wall of defense.

Some of the most careful observers declare that they have known, in their own experience, an absorption of dentine, under a perfect plug, to take place to the extent of exposing the dental pulp; the exposure taking place absolutely without dental decay, and to such an extent that there could be no mistake about it.

A large number of intelligent men are quite sure, from a great

number of observations, extending over many years of experience, that the permanent teeth of the adult may become less dense in the structure of the dentine than the same teeth were at a former period; in fact, an interstitial decalcification of that tissue having taken place.

These facts prove, then, that the two opposite processes of calcification and decalcification may, and do take place, in the perfected hard tissues of the teeth, and furthermore, that the basal structure itself, or the animal portion of dentine, may be removed without chemical action.

Beside the foregoing facts, I wish to describe a condition of the enamel and dentine which I have very many times observed, namely: a black or brownish spot is seen on the proximate surface of a molar or bicuspid tooth; it is smooth, hard and glossy; in fact, seems to have as dense a *surface* as glass, or as the uncolored and perfect enamel on the same tooth. A fine excavator, in passing over it, detects no abrasion or disintegration. On cutting into this discolored portion, the tissue appears as solid, for a little distance, as ordinary enamel. The *dentinal* surface of this enamel is somewhat lighter colored than the exterior. As soon as the *dentine* is reached, we observe a softer condition, but the dentine is not discolored, still it seems somewhat decalcified. On proceeding a little further, we find this tissue still softer, caused, apparently, by a *greater* decalcification, and then we come again to normally hard dentine. In all this there is evidently no loss of *basal* structure, either of enamel or dentine, but there is a loss of *substance*, and this is in the *lime* salts of the dentine. It is apparent that here has been no *external* loss of tooth substance; there has been no chemical process taking place; but there has been a vital movement in the interior of the tooth; in fact, among the tubuli themselves, resulting in the process called absorption, the calcareous elements having been carried away through the interior vessels of the tooth, and not by a chemical wasting away from the exterior.

A progressive history of this diseased condition would result in showing, that after a longer period the exterior blackened surface

would show signs of disintegration; the surface would become roughened; little pits would be found in it, and on cutting it with an excavator the enamel would be found softened and granular; it would easily break down under the instrument, and show discoloration as deep on its dentinal surface as on its exterior. Beneath the enamel the dentine would show a brownish discoloration, and an entire decalcification for a greater or lesser distance, until the normally hard and healthy dentine is reached.

Now, in this subsequent history of this disease, we probably have more or less chemical action to account for, and an *exterior* loss of substance produced by it. And this exterior chemical action of acids on the enamel will undoubtedly progress towards the interior or dentinal portion of the tooth, as rapidly as a fresh surface is presented by the washing or wasting away of the decomposed tissues.

Pertinent to the subject would be the question: What has caused the condition of things corresponding to the *earlier* history of the tooth described? I answer, *necrosis* of the enamel was produced by pressure of a contiguous tooth, causing the circulation of the blood plasma to cease in the basal substance of the enamel, and discoloration taking place as a consequence of necrosis, as usual. The irritation or inflammation consequent on or simultaneous with this necrotic process caused the vital movement in the dentine which carried away its lime salts.

It must be remembered that irritation of a tissue may produce, under, apparently, the same circumstances, either of two opposite vital movements, namely: a loss of substance, or an increase of substance. This is known to be the case in the bones of the body and in its softer tissues. In the teeth themselves exostosis is caused by the irritation of a dead and decomposing pulp, at other times absorption of the cementum and dentine of the roots takes place from the same cause.

I have already instanced the absorption of dentine under a plug which had irritated the dental pulp by the thermal changes produced by the conducting powers of the metal. At other times the same irritation produced by the same cause calls into activity

those vital movements which protect the pulp by a new deposit of dental tissue between the pulp and the plug.

And here we will call to mind, again, that result of vital activity which interposes a denser wall of dentine around a carious cavity in which chemical processes were in the active destruction of tooth substance.

With these facts before us, is it not probable that in many cases of chemical disintegration of the teeth, the irritation produced in the dental tissues causes a vital movement, resulting in rapid decalcification of the dentine, and perhaps, also, absorption of the basal or animal substance of that tissue, instead of the opposite process of extra deposition of lime salts in the dentine as a barrier to the decaying process?

It seems to me, from the foregoing observations, that taking a broad view of the process of dental caries, we must give to vital action an important place in its history.

In conclusion, I wish to say that I have read Dr. Chandler's translation of Leber and Rottenstein's Researches on Dental Caries. These authors give great importance to influence produced by the Leptothrix Buccalis, which they say is almost invariably found in all carious dentine and enamel. This fungus is also found upon the tongues and upon the gums of persons who are not particular in cleansing the mouth daily. My conclusions, taking their *observations* as correct, which I believe they are, lead me to consider the Leptothrix as an agent which cannot initiate dental caries, but as a concomitant of the disease, may accelerate its progress. And I would here take occasion to heartily recommend the work of these authors on this subject to my professional brethren.

DISCUSSION.

Dr. C. S. Smith, of Springfield, Ill.—This subject has been much written and theorized upon, and there is no lack of theories

to account for the decay of teeth. We have the vital, the chemical, the chemico-vital, the electric, and the leptothrix theories, and no one knows how many more, but there are still many facts in connection with this disease that no one of these will fully explain. The essay stated that all these very probably had something of truth in them, and this is the opinion of the speaker. Acids are generally admitted to have a large influence in producing caries, but if the disease were simply a solution of the tooth substance in acids, we should be able to produce the same results by experiments out of the mouth. Theoretically, the more vitality a tissue has, the better able it should be to resist the action of acids, and vice versa. Therefore, the enamel having less vitality than any tissue of the body, should be first to succumb to the action of the acid. But do we find this the case in caries? On the contrary, we frequently find the dentine entirely excavated by caries, leaving the enamel standing almost intact. Then, too, tubular consolidation, which has been characterized as a protective action on the part of nature, being the substitution of a less vital tissue, and therefore one more susceptible to the action of acids than the original organized contents of the dentinal tubules, would, according to this theory, be but adding fuel to the flames, instead of a protective action. The chemical theory alone, therefore, will not answer, and there are objections almost as strong to the vital and other theories, so that really the matter is as yet quite open for investigation.

Dr. DEAN, of Chicago, agrees with the essayist as regards fungi being the result, or rather the concomitant, and not the *cause* of caries. Can see how absorption of the dentine might possibly arise from irritation of the pulp when the dentine is within the reach of the absorbent vessels, but has never seen such a case, and believes their occurrence must be exceedingly rare. Cannot agree with the paper fully in regard to the vital theory. If when the enamel is sound or impervious to acids, the dentine may be absorbed directly beneath it, from irritation caused by contact of the teeth, laterally, he would suppose that the same result might

be looked for beneath the enamel on the masticating surfaces, or even beneath a gold filling, which is forced down upon the dentine during every act of mastication; cannot conceive it possible for the dentine beneath and adjacent to the enamel to be absorbed. He explained the reason why dentine, the tubuli of which had become infiltrated with lime salts, was less liable to decay than the normal dentine; this was owing mainly, if not entirely to the lessened amount of surface exposed to the action of destructive agents.

Dr. KILBOURNE, of Aurora, asked the essayist if exostosis was the result of dead or decomposing pulps?

Dr. CHASE—Yes, any irritation may produce exostosis, this vital force may build up or tear down tissues. He has seen these cases, and knows them to be facts, others have seen them and men whom he believes. He did not say *decay* took place under enamel, but that absorption of lime salts took place under necrosed enamel. If a tooth has the power to build up, has it not the power to take down?

Dr. MC GARVEY, of De Witt, Ia.—In ninety cases out of every one hundred, teeth receive an injury from fermentation. After close examination, we can generally trace the predisposing cause to some disease during formation, as measles, &c. Had in his own mouth a small cavity, which had been filled, filling failed—the cavity was polished, and since then, he has given great care to cleanliness, and decay has disappeared.

Dr. INGERSOLL, of Keokuk, Ia., has never heard any theory fully accounting for loss of tooth substance by caries. If it be true that the hard tissue of the tooth be lime, we must look for its solvent where chemists do. They find that only acids will dissolve lime rock. Now, if it will dissolve the lime rock, why not this alone, the lime of the tooth? The fact alluded to of the lime salts of the enamel not being as rapidly dissolved as dentine, is because of its greater density. A solid piece of lime rock will take a longer time in being dissolved than porous rock or powder-

ed rock. Vital decay, he considers a misnomer, an antagonism of ideas, impossible in the nature of things. Believes in the theory of the general waste and building up of tissue (excepting enamel) —it is an old physiological fact; believes in absorbents in the pulp also, to carry off its own waste matter, by a law as universal as that of nutrition. The dark stain under enamel of teeth at the point of contact, he accounts for, not by vital action of the pulp, but by the death of the nerve fibrils of the dentine, caused by pressure and abrasion. In dentine, there are from twenty-eight to thirty parts of animal matter. No theory of decay ever takes into account the loss of this material. It is not by vital action, because it is found intact after vitality of the tooth ceases It is not by acid, for acid is not the chemical solvent of animal tissue. Alkali is its chemical solvent, but it must be caustic. Must then look elsewhere for the cause. We know that under the influence of heat, moisture and oxygen, animal substances readily decay. Exclude any one of the three, and the substance is preserved from decay. Familiar examples prove this. Exclude heat by the process of freezing, and animal and vegetable substances are preserved; exclude the oxygen of the atmosphere, as in the culinary process of canning, and the contents of the can is preserved; exclude moisture, as in cases of dessicated meats and vegetables, and the same are preserved so long as they are kept perfectly dry. We have in the mouth, in contact with decaying teeth, the oxygen of the atmosphere, the moisture of the saliva, and the animal heat of the body. These three being present, the animal tissue of the tooth having lost its vitality must decay. Exclude any one of the three, and the tissue is preserved. In the process of filling, we exclude both moisture and oxygen.

Dr. Sanborn, of Tabor, Ia.—Imperfect development of the teeth makes them less liable to withstand decay. All matter is organic, when in an organized body—lime and all. When lime is deficient, decay takes place more readily, children's teeth, lacking in lime, decay easier. This is the best evidence that decay is the result of chemical action. The removal of tooth substance

under a filling, cannot be decay, if absorption it may be spontaneous absorption; under certain circumstances, use wears away teeth, and this has been mistaken for spontaneous absorption; does not consider this a vital, but a mechanical process. He should not call the decay of tooth substance fermentation, or say that the destruction of tooth substance produces acid.

Dr. Low, Chicago—There are so many causes that it is almost impossible to follow them up; civilization is a great cause of decay in the teeth. We do not find caries in peoples who live naturally, and upon natural food. The American people have more decayed teeth than any other; hot drinks help to produce feeble teeth, which cannot resist disease; imperfect nutrition gives imperfect tissues; the main cause of decay is poor development.

Dr. Chase felt as though everybody was bound to put him in a false position. He did not intend to convey the idea that vital action was entirely the cause of decay. Admits that acids destroy the greater part of the tooth substance. Simply wished to show his views regarding the vital theory. Absorption does take place where there are no absorbents, it may take place through cell structure, without absorbent vessels, and the vice versa with nutrition.

Dr. Dean, Chicago, said he could not comprehend how the dentine could be removed from beneath the enamel, and carried by *cell absorption* to the vessels in the pulp. The dentine was "*formed material*," and had ceased to be cells, and he thought incapable of transmitting lime salts in the manner suggested by the essayist. If absorbed at all, it must be by the contents of the dentinal tubuli.

He could not blame the essayist for being annoyed at the misconstruction, by the speakers, of his views expressed in the essay; but he had the consolation of not being alone in that respect. An essay was read that afternoon, in which the writer endeavored to show that the lime salts of the deciduous teeth, and certain portions of other tissues might be used again in the repair or

growth of the system; that nature economised by saving such materials as she could make further use of. But when the question came to be discussed, the writer of that paper was mortified on hearing one of the most learned and clearest heads in the profession conclude his remarks by asking why a person starved to death, if nature was as economical as claimed by the essayist?—thus intimating that the writer held that every particle of matter in the system could be indefinitely re-appropriated by the tissues! (Laughter.)

Dr. Crouse, Chicago—Can agree perfectly with the essay on the subject of fungi, that is the want of proof that they assist much in causing dental caries. It is also a well-established fact that nature makes an effort to arrest decay. We find this in different degrees, in many mouths, when a hard substance has been thrown out, even to the extent sometimes, of arresting the decay. Where the caries is arrested by nature's efforts, or vital action, as the essayist terms it, she is generally assisted either by the tooth breaking away or the approximal tooth having been removed, so that food does not lodge, or is more easily removed, and the acids are washed away by the saliva flowing through the channels thus made. Or the health of the patient may have improved, and a corresponding improvement in the secretions of the mouth have taken place, each of these aiding many times in the arrest of caries.

The speaker thinks the theory advanced in the essay to account for the dark spots and loss of substance underneath them, which occurs on the approximal surfaces of teeth, an absurd one. The position of the teeth alluded to is such that the food which lodges between them is allowed to remain until fermentation has taken place, and acid been formed, causing the condition alluded to in the paper read. If one of the teeth had been removed, or space secured sufficient to have insured perfect cleanliness, after the enamel only had been affected, the probabilities are that none of this destruction of dentine, either vital or otherwise, would have continued. When the dentine itself is decaying, acid may be

formed from parts of the decomposing tooth, which would hasten decay very materially, especially in that class of caries where the opening is very small, thereby preventing its free escape from the cavity.

Does not believe that absorption ever takes place to the extent of exposing the pulp under a gold filling. Has never seen a case, nor does he believe in those reported.

The fact is the pulp was exposed when the tooth was filled, and the operator failed to make the discovery until the tooth gave trouble, then, upon removal of the filling, the pulp was found exposed, and the failure is accounted for with a new theory. He has removed fillings, and found an exposed pulp, and even found it dead, when he had not expected an exposure, but it needed no new theory to account for the fact. Without doubt, they were exposed when he filled the teeth, and he failed to discover it; he has removed fillings, gold and amalgam, which were forced "unmistakably and without doubt," into the pulp cavity, and on the pulp, and he has no doubt the operator did not suspect that the pulp was exposed.

It would not be very surprising to learn next, of somebody taking shelter under some new law of nature, when they find their filling has gone into the pulp cavity, to account for one part of the filling going into the pulp cavity after the tooth is filled.

Dr. Porter, Dubuque, Ia.—There are two species of decay, black, or slow, and white, or rapid; the true cause of decay is the use of hot foods, powerful medicinal remedies and hereditary transmission. Parents with poor teeth, at conception of offspring, will propagate these in their children.

Dr. Smith, of Burlington, Ia.—The idea of exercise seems to have been forgotten, believes if teeth were used more, and with more solid food, &c. decay would be less prevalent. A traveler in the Sandwich Islands found more decay of the teeth in the skulls of a prehistoric people than among Americans of to-day;

believed this the result of a pulpy food, provided by nature, and the indolent habits of the people. Our food of to-day is too much prepared, and the teeth do not get sufficient exercise; other parts become enervated without exercise.

Dr. WHITE, Davenport, Ia.—In conversation with a gentleman who has traveled several years in the Sandwich Islands, he stated the cause of the bad condition of the nation's teeth to be syphilitic taint.

PIVOT TEETH.

BY E. D. SWAIN, CHICAGO.

The painless extraction of teeth, together with the easy and cheap methods now in vogue of inserting artificial dentures upon plates, have the tendency largely to throw the attachment of artificial crowns to natural roots, by means of pivots, into disuse; though, under favorable circumstances, this is admitted to be one of the best modes that can be adopted. If the roots on which they are placed be sound and healthy, or if not healthy, made so, and the back teeth be reasonably good—that too much strain may not be thrown upon the pivoted tooth—these will subserve the purpose of the natural organs more perfectly than any other description of dental substitutes, and can be made to present an appearance so natural as to escape detection upon the closest scrutiny, as well as to render valuable service for many years. In short, their advantages may be summed up as follows: A better preservation of the contour of the parts surrounding; nearer approximation to nature; greater firmness, and therefore more serviceable, and greater economy for the wearer; besides giving to the operator, when successful, a sense of having done that which is best for his patient as well as himself.

Prof. Austin, in the chapter upon this subject in Harris' "Principles and Practice," informs us that only the six anterior superior teeth should ever be pivoted, and questions the propriety of pivoting to the roots of lateral incisors unless of very good size; further he tells us that in no case should a lower incisor be placed upon a pivot, because of the great danger of ulceration, and their

small size. Both these objections I consider to be without good and reasonable foundation. Fortunately we are very seldom called upon to replace single teeth of the latter class; and my experience has been that ulceration, when in that condition, is as easily managed as in other single straight rooted teeth. If called upon, however, to insert an inferior incisor where the root was intact, I should consider the pivot superior in every sense to any other known method. Bicuspids (especially the superior) may be, and often are, successfully set in this manner.

One of the strongest arguments in favor of pivot teeth is the *retention* of the root, and thereby preventing absorption of the alveoli about the necks of adjoining teeth; the removing of one tooth or root is taking the keystone from the arch.

The result, we all know, in time, is the gradual elongation of the tooth, or absorption of the socket of adjoining teeth, exposing the root and weakening their support, and even sometimes, when an artificial tooth has been constantly worn on a plate, the adjoining teeth incline toward each other, and thus disfigure an otherwise comely set of teeth.

In the days past, when the nutrition of the teeth was not so well understood as at present, when it was believed that a pulpless tooth was dead, and would, like any other foreign substance, be thrown out, men were perhaps excusable for extracting such teeth under all circumstances; but with our better knowledge, our duty is to preserve, and thereby keep together, the different parts of the human machine as long as possible. That a so-called devitalized tooth is not entirely dead, we all know; that they do die, however, is equally true; and when death has ensued, no amount of treatment will induce their retention, but, like other foreign substances and dead tissue, it will be disposed of by the processes by which nature accomplishes such work. A crownless root I consider far more apt to become diseased and die than one not deprived of that very essential portion, because, with the crown, it has lost that essential stimulant to good health, viz.: exercise, and consequent irritation, inducing better circulation of the blood about it, and therefore better nutrition.

There are to-day few intelligent and conscientious practitioners in our profession who would extract an ulcerated superior incisor with crown complete, half, or even a larger proportion, gone; but they would, by proper treatment, heal the same, fill the root and restore the crown to its normal shape with gold, sometimes even to disfigurement. I am sorry to believe, however, that many of these same practitioners would extract, did there not exist the opportunity to display an advertisement in the shape of a contour filling. It cannot be that the half crown restored with gold to its normal form in any manner assists in maintaining the healthy condition of the root, otherwise than as has been mentioned, by giving the necessary exercise, and thereby better circulation and nutrition.

If a root can be made healthy and capable of supporting a natural, dead crown, and fifty per cent. of this a foreign material, why may it not support an artificial crown equally as well? I say dead crown, because I understand it to be admitted that the enamel and dentine of a devitalized tooth are dead, and that the tooth is only retained through the life of the cementum, in which the vitality is of so low an order that it tolerates the dead dentine within. This is certainly a very fortunate condition of things for those who advocate contour fillings in devitalized teeth, or the setting of pivot teeth upon such roots.

The first step to be considered is, of course, the preparation of the root for the reception of the artificial crown. If it be in a diseased condition, it must first be made healthy. My practice is, first, after removing a sufficient quantity of the remaining crown, to give free access, to enlarge the pulp canal, and, if there be no indications of active disease, use such remedies as will thoroughly disinfect the same; then pack with cotton loaded with the saturated solution of iodine in creasote, and seal tight. If no soreness arises after two or three days, I then feel safe in filling that portion of the canal above the hole which is to receive the pivot, either with gold, cotton dipped in liquid gutta percha, or Hill's stopping. I prefer the latter because of its indestructibility, and because it can be easily and thoroughly introduced, and if trouble

arise it may be easily removed for further treatment. If an ulcer exist, disinfect as in the first case, and leave the root open or filled lightly with cotton for a day or two; then inject the solution of iodine and creasote through the foramen and fistula, if there be one. Unless it be a very obstinate case, one dressing of this character will suffice, leaving for a few days with a simple light cotton stopping, and as soon as the fistulous opening is healed, proceed, as before mentioned, to fill permanently.

The preparation of that portion of the root which is to receive the pivot may depend entirely upon the condition of the root and the kind of crown to be attached, and possibly upon the length of the patient's purse, for "the poor ye have always with you," and they cannot be turned away. It may be carefully and thoroughly filled, covering every portion of dentine, around a gold tube, which is to contain the pivot; or it may be simply drilled sufficiently large for the reception of the pivot, be it of either wood or metal. I have, when badly decayed, prepared as for a gold filling, and filled with amalgam, using for the tube platina instead of gold, because convinced that there is less galvanic action between the alloy and this metal, than exists between the alloy and gold. About three years ago I inserted two central incisors for a patient in this manner, which are at the present writing every way satisfactory to myself as well as to the patient.

The use of Wood's fusible metal as a root-filling is dangerous as well as otherwise unsatisfactory — dangerous because the heat necessary to be applied is often sufficient to cause death to surrounding tissues, and consequent eventual loss of root—os artificial and Guilois' cement are not sufficiently reliable as to their permanency, being in a large majority of mouths dissolved by the oral secretions. If the first method be decided upon, viz.: the tubing and filling of the root, I proceed first to the manufacture of the tubing or hollow wire; selecting a piece of iron, or, what is better, steel wire the same size as the gold wire to be used for pivot, around which bend a piece of eighteen carat gold plate, fitting as closely as is possible with mallet or hammer; then reduce to the proper size and thickness by drawing the

whole through a wire draw-plate. Having reached the desired size, remove the wire, and solder the joint to give stiffness in future use; then, with a screw-plate, cut a thread about as far as will be necessary for the case in hand—from one-half to three-eighths of an inch; then drill the root just large enough to admit the tube being firmly screwed into it, without using sufficient force to twist it. It is unnecessary to tap out this hole, as the thread upon the tube makes sufficient thread for itself, and holds firmer than when the tap is used.

These preparatory steps do not necessitate the filing away of the crown to the margin of the gums. In fact, it is the best not to do so until the rubber dam is adjusted, which may be carried sufficiently high to be out of the way, and secured by two small gold screws as nearly upon the mesial and distal surfaces as it is convenient to drill, tying above them a well waxed cord of silk; this will in nearly all cases retain the dam securely. This accomplished, that portion of the crown necessary to be removed may be filed away, or, what is better, cut away with proper shaped burs with any of the burring machines in use. Then, if the root be a sound one, cut a cone-shaped cavity in its end, with undercuts deep enough, which, with the thread upon the tube, will retain the filling firmly. If decayed, of course remove all disorganized tooth substance, as in any other case when preparing for a filling. Now screw the tube into place, leaving within it a piece of the wire over which it was made, to prevent injury to its inner surface, and proceed to fill. The filling should in all cases cover every portion of the root's end, and also be built down sufficiently far to leave, when filed off, a cap or plate of the necessary thickness for a solid foundation, and stiffness enough to remain in place. If the crown be already broken, or decayed away to the margin of the gum, a ferrule of gold or platina may be fitted around the end of the root, secured with gutta percha or *os artificial*, and the dam put on over this; or in comparatively dry mouths, if the parts be wiped dry and painted with the liquid gutta percha or collodion, thus effectually preventing the secre-

tions from these parts giving trouble; using napkins, as in general filling, to control the flow of saliva.

These details will apply to the preparation of all roots where tubing is resorted to. If the filling be of amalgam, the rubber dam may be dispensed with. Complete dryness is, however, quite as essential for a perfect amalgam as for gold fillings.

The root prepared by any of the above or other methods, we next turn our attention to the crown to be attached and kind of pivot to be used.

Prof. Austin, after canvassing all of the known materials used for pivots, concludes that wood is superior to all others, for the following reasons: First, that it holds the crown firmer; and secondly, because it does not, like metal, wear away the root. That when first introduced it does retain the crown very firmly, is true—no more so, however, than metal may be made to do. The second conclusion in its favor, or objection to metal, is not of sufficient importance to be considered. Any material firmly held in place will not wear the roots, or tube, sufficiently to be observed in at least one generation, and in these cases we do not work for anything beyond our own day and age. When by chance the holes in root and crown to be set are opposite, and the pivot straight, and the patient does not object to the odor always arising from a tooth set in this manner, wood answers a very good purpose for a limited number of years.

We all understand that constant dryness is one of the essentials in preventing decay of tooth substance. A wood pivot necessarily gives us constant moisture; in fact, it depends upon this property of absorbing moisture, in a great measure, for its firmness. Saturated with pure water even, it would hasten decay; but when saturated with such fluids as it must be in the mouth, what must be the result? Therefore, when permanence is to be one of the considerations, we must discard wood, and select a material less destructible. For reasons embodied above, in my own practice I have adopted the metal pivot, and will feebly endeavor to point out some of the ways in which it may be used.

If it be desirable to use the crown known as the pivot tooth,

either a platina or stiff gold wire may be inserted into it by dipping the end of the wire into pulverized borax, inserting into the hole and flowing solder about it. No trouble will be experienced in accomplishing this, if it be remembered to keep the highest heat upon the tooth. The solder will fill the space about the wire, fitting into all the irregularities of the hole and holding very firmly. When the holes in root and crown are opposite, like the pivot of wood, this answers a very good purpose; and even when an obtuse angle is necessary in the pivot, it can be much easier fitted and be made stronger than the wood pivot. The attaching of a pivot of metal to the plain plate-tooth requires more labor, but, in my opinion, its superiority in all respects more than compensates for this. It is easily adjusted to conform to the other teeth, be the root before or behind the arch, whether the hole, owing to the direction of the root, be straight or at an angle, as well as possessing greater strength.

It is usual, first, to secure an impression of the end of the root and adjoining teeth, to make metal dies, and swedge a piece of plate to cover the end of the root; this to be punctured at the point covering the hole prepared for the pivot, and, when fitted, soldered to the pivot. Upon this plate the tooth is to be set, the two pieces cemented together with shellac and adjusted to the mouth, removed and soldered. If to be so made as to be removed at the will of the patient, the pivot must be made of two halves of half round spring wire, or split with a fine saw before inserting, the two parts being sufficiently separated to form a spring, which will retain the tooth in place. If to be securely fixed, the hole should be a little larger than the pivot, and the pivot should be coated with Hill's stopping or gutta percha, the root wiped dry, the pivot and coating warmed and forced home, and so held until the whole becomes cold; then trim away the surplus materials. This not only holds the pivot firmly, but fills the space between the plate and root, thus protecting the latter. Gutta percha I think preferable because it adheres closer to the root and pivot. During the past three years I have set many teeth in this manner: Preparing the root as for a wood pivot, take an impression,

and upon the plaster cast burnish a plate of pure gold or platina, fix the pivot, and try it in the root. If the plate does not fit accurately, it may be fitted either with a burnisher or by mallet force, with a large pointed plugger; then attaching the tooth as above related, and the whole secured in its place with gutta percha.

I have seen roots upon which teeth set in this manner, after several years wearing, showed no signs of decay. This method saves time, and, therefore, money to the patient, when such an end is desirable, and gives a very substantial and satisfactory result.

Another very good suggestion upon this subject is given in the March No. of the "Cosmos," 1873, which I cannot describe better than in the writer's own words:

"Instead of adapting a crown with a fixed pin of either wood or metal to a root, insert a metal pin in the root, make a filling of gold on the end of the root, and adapt the crown to that. There will only be exposed what appears to be a small filling along the margin of the gum. Our method is to insert an eighteen carat pin into the root, by means of threads cut on that part of the wire to be inserted, having the other end cleft with a fine saw, and protruding sufficiently to occupy the hole in the artificial crown. The wire having been firmly screwed into the root, and a proper crown selected and adjusted, enter two or three of Dr. Mack's small retaining screws, cut pieces from the heaviest gold, say No. 480, a little larger than the end of the root, with holes punched to correspond with the screws inserted in the root, lay on one after another, condensing with smooth faced instruments, occasionally paying special attention to condensing small pieces around the pins, maintaining the convexity of the root; then set the crown, and file and burnish down the protruding gold about the edges of the roots."

With this method, I do not understand it to be the intention of the writer to file the root below the margin of the gum. The capping of the end of the roots is made easy by the help of the rubber dam. This is, so far as the preparation of the root, some-

what similar to Dr. Mack's method; but for a crown he provides a patent tooth, with a slot for the reception of two or more screws, secured in the root, the slot to be filled with Wood's fusible metal, Guilois' cement, or other plastic material. This method fails, owing to the destructible nature of the materials used in uniting the crown to the root.

I have with me a couple of these patent teeth, that any who desire may examine. In the November No. 1872, "Cosmos," there appears an article headed "Artistic Dentistry," by Dr. H. M. Webb, of Lancaster, Penn., in which he gives a description of what he terms grafting, which is, in fact, the restoration of the crown with gold, but faced with porcelain. It involves the same principles as the plans above given, viz.: the protection and prevention of further decay of the root, and though by no means entirely new, is truly artistic and enduring. Such work was recommended several years since, by Dr. Dwinell, and I know of at least one bicuspid root thus provided with a crown some four or five years since, by a practitioner in Chicago, in the mouth of one now present. Although operations such as these are tedious to operator and to patient, as well as necessarily expensive, they possess advantages, and one is that a tooth when fractured obliquely and devitalized, it may be desirable to save that portion of the crown remaining, and as objections are urged against the exposure of so much gold, the porcelain face may be attached, firmly secured and backed up with cohesive gold, showing only a fine line of gold at the point of union. As the treatment of diseased teeth by extraction and replanting is at the present time being somewhat agitated, and has in many cases proved successful, I will relate two cases of extraction of roots with pivoted crowns, and then returned to the sockets, with results.

Dr. Meredith, of Cincinnati, publishes his experiences something as follows:

A patient called, desiring a pivot tooth set upon a root much diseased, and very loose, advised extraction, which was not consented to. A pivot tooth only would satisfy the patient. After much persuasion, and some compunctions of conscience, the doc-

tor consented, proceeding to business, and succeeded to his satisfaction in the selection and setting of the substitute, except finding it somewhat too long, and in the attempt to remove it, for the purpose of shortening, extracted root and all. Fearing a brisk breeze if the patient discovered the mishap, he placed over the other teeth, and place where root had been, a napkin, requesting that it be retained there until his return, retired to the laboratory, shortened the tooth, cleaned the root properly, and returning, forced the root again into the socket, dismissing the patient. After a reasonable amount of soreness, this root became healthy, and does service at present.

Dr. Brophy, a practitioner of Chicago, related to me a case in practice, involving the same principles. He, however, extracted purposely a root, upon which an artificial crown had been some time worn, treated as is recommended for ulcerated teeth, and replanted. This also became a healthy organ, and bids fair to do good service for a number of years.

These cases I mention simply to show that treatment which is admissible for diseased roots bearing natural crowns may successfully be resorted to with roots bearing artificial crowns, whenever it would seem necessary or desirable to attempt to save them. The cases when such practice would seem to be necessary may be few and far between, still when they do present themselves, the experience of the gentleman above mentioned may be of great value.

DISCUSSION.

Dr. Kilbourne, of Aurora, Ill., thought that in country practice especially, the use of pivot teeth was preferable to large and costly contour fillings, has used them for more than twenty-five years. Files down the root below the edge of the gum, without the use of dam, and drills hole in a line with the direction of the other teeth, and without regard to direction of root canal. In-

serts on wooden pivot. Recently reset a case of this kind, put in eleven years ago, removed the decay from the root, inserted a soft wood pivot, half an inch long, in enlarged root canal, cut undercuts in the bell-mouthed cavity of the root and filled around the soft wood with amalgam, allowed all to remain until after the amalgam had become solid, then withdrew the soft wood pivot, and inserted a tooth on a hard wood pivot. The essayist's manner was no doubt superior, but it is too expensive.

Dr. HARLAN, Chicago, recently saw a patient in whose mouth a pivot tooth had been inserted by a member of the Illinois Society, which he wishes to mention on account of its unusual firmness—it was a plate tooth attached to a gold pivot, fastened in the root with gutta percha. The patient received a kick from a horse in the mouth, the tooth was broken, but the pivot remained firmly in the root.

DISEASED CONDITIONS—THEIR EFFECTS UPON THE TEETH.

BY G. V. BLACK, JACKSONVILLE, ILL.

Pathological conditions have not been very closely studied in relation to their effects upon the teeth, and we find our knowledge of them somewhat obscure.

A great many writers have seemingly rested their conclusions upon the merest hypotheses, or upon the views of preceding writers, which we are often unable to trace to any specific observations sufficient to render their opinions authoritative.

What is known of the pathological chemistry of the secretions is much scattered in different works, so that it is difficult to collect them, and often their great variance renders the formation of correct conclusions impossible.

On many points, however, we find among the abler zoo-chemists who have made pathological investigations, a tolerable agreement, and considerable reliable information as to the changes which take place in the secretions.

A number of theories yet exist as to the cause of caries of the teeth. One point, however, we think, may be considered as established, *i. e.*, that the presence of acids is necessary to its inception and progress. We shall, therefore, offer no argument on this point, but, for the most part, confine ourselves to those conditions in which acids are introduced into the oral cavity by way of the secretions, using freely what we have obtained from different authors, with our own observations. The extended citation of authors, however, would render our paper too long. Neither can

we do more than give prominent features, with here and there some details.

It is well known that the teeth are harder in old age than in youth; that the texture of the teeth becomes firmer as age advances. It has also been noticed repeatedly that the teeth are liable to considerable fluctuation in this respect; that teeth which had previously been noticed to be very firm in texture are afterward observed to be quite soft.

This softening has been noticed more as occurring in pregnancy than in any other condition, and has been attributed to the withdrawal of the lime salts to build up the bones of the fœtus.

It is very generally supposed that the reason for this drain is to be found in the lack of lime salts taken with the food.

I have frequently noticed that the teeth of consumptive patients become very much softened, which I regard as the direct result of the failure of the nutrient functions. A like result is liable to ensue from any failure of nutrition, such as long-continued anæmia—from long-continued fevers, or any great depression of the vital powers. Just what changes take place in the constituents of the dentine in these cases is not definitely ascertained, and this point will doubtless be a very difficult one to settle. We are inclined, however, to the opinion that the phosphate of lime is diminished, while the carbonate may be increased. This theory explains more perfectly the universally admitted fact of their being more rapidly destroyed by caries—the carbonate of lime being more soluble than the phosphate.

Much close observation has convinced us that this softened condition contributes but little to the *inception* of caries, but that it allows decay that has become established to progress with greater speed. For the inception of caries, another derangement seems necessary besides the softened condition of the teeth themselves. *Normal saliva* being *alkaline* in reaction, evidently has the effect of neutralizing any acids that may be brought in contact with the teeth. It therefore follows that acids, to effect the solution of the tooth substance, must be in some manner protected from alkaline saliva. This may possibly happen in some positions between the teeth,

but such an occurrence seems hardly probable. Neither does it seem probable that the food lodging between the teeth, and decaying, would, while bathed in an alkaline fluid, be able to produce an acid which would effect the solution of the tooth substance. If, however, in connection with such lodgment, an irritation of the gum be produced, and in consequence an acid mucus be poured out into, and around, the decaying food, we have more reason to suppose that an intensely acid condition may arise, and caries be established. If, however, the entire fluids of the mouth be acid in their reaction, as the result of disease or constitutional anomaly, then we can understand how an intensely acid condition may arise in secluded positions about the teeth which favor the lodgment of food, or of the saliva itself—for this substance is liable to speedy decomposition. In such a case we have no neutralizing element, and no check, either as to acid fermentation or its action on the tooth substance, and therefore caries is readily established. When a breach is made in the substance of the tooth, and something of a cavity is formed, presenting only a small opening, and in consequence an almost statical condition of the contents is maintained, it is plain that the very small addition of saliva will only serve as food for acid fermentation, and the caries will continue to progress, although the saliva may have returned to its normal condition of alkalinity. If, however, the acids have only softened a portion of the substance, and no cavity be formed, or even if the cavity formed have a broad opening, admitting fluids freely, then it usually occurs that the action ceases on the return of the normal quality of the secretions; and the part affected changes to a dark color, forming the spots and so-called "black decays" so often seen in the teeth, and so remains, until a renewal of acidity forces the action deeper into the substance of the organ.

If normal saliva is alkaline in reaction, then acidity of this fluid is a diseased condition; and if what we have just said be in anywise true, it is a diseased condition of the utmost importance to the dental surgeon—one which he should labor to understand, and, if possible, to correct.

That the healthy saliva is alkaline, is the opinion of all the

great experimenters in zoo-chemistry, among whom we might mention Liebig, Lehmann, Wright, Jacubowitsch, and various others. For five years we have been constantly in the habit of testing the saliva of our patients, and are fully convinced that the views of these men are correct, as applied to our own people. We are not unmindful of the fact that a great many tests have been made, and some reports published, that seem to show that acid saliva was the prevailing condition, to which there was very few exceptions; and for this reason we have been very cautious in our observations, and somewhat slow to publish results.

In making the seemingly simple test of the saliva, very much care is necessary—much more, indeed, than most persons would be likely to admit. In the first place, it is necessary that the test paper should be just right. The color should be uniform throughout, and when dipped into a known neutral fluid, should remain uniform. I have frequently purchased litmus paper that would, when dipped into water, show red spots, or streaks, here and there, over its surface. Such paper will certainly lead to error, and should, therefore, be discarded. The greatest care should be taken to prevent injuring the paper in handling, for it is known that the exhalations from the skin are acid in reaction, and may adhere to the paper in so dry a form as not to color it, but do so quite decidedly upon dipping it into water.

In testing the saliva, any point in the mouth may be selected where the fluid seems most abundant, care being taken not to touch the lips or other parts not thoroughly moistened, otherwise we will be liable to touch mucus that is unmixed with the other secretions, which will often show an acid reaction, when the mixed fluid would be neutral or alkaline. (When we use the term saliva without qualification, we always refer to the mixed fluids of the mouth.) If, when the paper is withdrawn, it shows changes in streaks or spots, it should be thrown aside, and a new test made. There seem to be two reasons for this streaking of the paper, aside from the faulty condition of the paper itself. One is, that the litmus is very readily washed out of the paper

by the saliva, and may run in streaks, some parts appearing light and others dark, thereby interfering with the proper reading of the test; or the color may be washed from the paper in such a manner that the whole surface may appear of a lighter shade, which may also lead to error.

The second cause is from mucus that is unmixed with the saliva, showing a different reaction from the mixed fluid. In ropy conditions of the mucus this is very liable to occur, for the reason that it does not seem to mix with, or dissolve very readily, in the saliva. This feature of ropy mucus renders it comparatively easy to determine its reaction. There is also a difference in the color of the paper when wet and when dry. The best way I know of to learn to read the tests correctly, is to take a vessel of pure water, another with a drop of acid added, and another with a drop of ammonia. Then dip a slip of each of the colors of litmus into the pure water, and lay them on a porcelain slab or a clean white napkin. Dip another into the acid water, another into the alkaline water, lay them by the first, and note closely the changes. Then add another drop of acid, and one of ammonia, and repeat the operation; and so on until very decided changes are produced. This should be practiced a great deal by any one who wishes to make close and accurate observations by the use of test paper.

In my tests I have, perhaps, found a small majority of the persons under twenty years of age, who present themselves for dental operations, have exhibited an acid saliva, while those thirty years of age and upwards have shown a considerable preponderance of alkaline saliva. Our examinations of persons outside of our operating room show plainly that our patients present a far larger per cent. of acid saliva than the community in general.

A single examination is in no case a sufficient basis upon which to found an opinion as to the habitual reaction of the buccal fluids, for there are frequently presented considerable fluctuations. Saliva which is habitually acid may become temporarily alkaline, from changes in the food eaten; or that which is habitually alkaline may become temporarily acid, so that frequent examinations are necessary to establish the habitual condition. The saliva also

presents a greater degree of alkalinity during digestion than after digestion has ceased, and the stomach is empty.

During my examinations, periods have occurred during which a large majority of those examined presented an acid saliva; other periods have occurred during which the opposite was true. Certain families have presented an acid saliva on all occasions, while individuals have presented an alkaline saliva at every examination.

The greatest proportion of acid saliva has been presented in the time of the prevalence of intermittent fevers, when for one month it amounted to 0.80. The smallest proportion of acid saliva was found during the month of February of this year, when it amounted to 0.23. During this month there was but little sickness, and the few cases were mostly thoracic inflammation.

We have examined the saliva of many persons who had never had a decayed tooth, and of those in whose teeth decay had evidently ceased, leaving a portion of the teeth in a condition of usefulness. Such persons have almost uniformly presented an alkaline saliva, and those whom we have frequently examined have all shown an habitual alkaline condition..

In cases where decay was evidently progressing rapidly, and was of light color, we have uniformly found the saliva habitually acid in reaction. In those cases where decay is making apparently rather slow progress, and inclined to be of a dark color about the margins and outer strata of the softened portions, we have usually found the saliva nearly neutral, but vascillating between the alkaline and acid reaction. In cases where the decays all present a black color, and this color extends into the still hard dentine, in those cavities with broad openings, we have very generally found the saliva alkaline. In this last condition, those cavities which have very small openings, or with openings closed by adjoining teeth, often present a lighter color in their interior parts, and are evidently progressing; but those that are black throughout we believe to have become stationary, and will make no progress while the alkaline condition of the saliva remains.

It is not unusual, by any means, to find a number of very dark

decays in the mouths of persons somewhat advanced in life, that have made no progress for many years. Then there must be some substantial reason for this cessation of decay. The cause of cessation cannot be found in any change in the structure of the dentine, for it is certainly undeniable that all classes of teeth, the hardest and the softest, are liable to decay; not only this, but we have frequently observed it in teeth that had lost their pulps when the decay was progressing—which precludes all possibility of changes in their dentine for the better; then the changes which have suspended the action of decay must be found in the buccal fluids.

The *mucus* is not unfrequently found deranged, while the other secretions present a normal condition. These derangements arise, for the most part, from diseased conditions of the membrane secreting it, and have, we think, been more accurately described by Tomes and Wedl than any other writers. Irritations of the mucus membrane produce acidity of the mucus. Thus, if food lodge between the teeth in such a shape that an irritation of the gum be produced, an acid condition will arise about it on account of the irritated gum throwing out an acid secretion, but if decided inflammation be produced, a serum will be exuded, which is nearly neutral or alkaline in reaction; while, if the inflammation pass to suppuration, and pus be formed, it is always alkaline in reaction. It is therefore, slight irritations of the mucus membrane which induce decay, and not active inflammations.

There is a very ropy tenacious mucus met with in some individuals, which often presents a markedly acid reaction; and is evidently the exciting cause of decay in their teeth. This mucus is occasionally secreted by the entire mucus membrane of the mouth, but we most frequently find it coming from some particular part, as from the gums or the surface covered by a plate for artificial teeth, or other parts. The membrane of the part is usually slightly thickened, and presents a somewhat more reddish color; but frequently by no means distinct; so that if the whole membrane be involved, it could not be detected by these features. It frequently happens that this mucus dissolves very slowly in the

other secretions, and is found coating the gums, giving them a peculiar slippery feeling to the fingers when applied to them. This condition is most frequently found confined to the gums on the facial side, and gives rise to decay about the necks of the teeth. We have seen a few cases where it extended entirely around both arches, but it is usually confined to particular portions.

The mucus is usually less strongly alkaline than the saliva; indeed a good many writers have given slight acidity as its normal condition; but this we think a wrong conclusion. It is, however, often found acid, when no disease of the mucus membrane is apparent. This may happen when the secretion from the salivary glands is normal, and may be detected by pressing the litmus to the gums when but slightly moistened. We generally find the mucus acid, in connection with acid saliva, and it is frequently difficult to determine without examining the secretions separately, to which secretion the acidity of the mixed fluid belongs. We have occasionally found the mucus alkaline, however, when the other secretions were acid.

A variety of forms of disease are accompanied by an acid condition of the buccal fluids. For information as to these, we are for the most part dependent upon the researches of Lehmann, Wright, Jacubowitsch and others. I have made many observations myself, with generally the same results. It must be remembered, however, that acid saliva is so common in this country that an observation during sickness is not of much value, unless the previous, or habitual condition is known; a fact which renders many of my observations valueless.

In fever and ague, and those kindred affections known as resulting from miasma, the saliva seems to be uniformly acid in reaction, often markedly so. My own observations seem to show that the saliva may become acid from this cause, while the general system is apparently unaffected; for I have certainly found a much larger proportion of acid saliva when they abounded, than at other times. This class of disease is also accompanied by a species of hyperæsthesia, which is a source of much trouble to the dental operator. The teeth are apt to be unusually sensitive,

and the patient so nervous as not to be able to bear the excavation of cavities with any degree of fortitude. It is unusually difficult to make a perfect operation, while the acid saliva searches out every fault to undermine and destroy the work we have accomplished. Teeth are liable to ache, and give trouble, that would not do so in better conditions of the system; and pulps capped are more liable to die.

Continued fevers are usually accompanied by an acid condition of the saliva. The mucus also is usually quite markedly acid. As the fever progresses, the secretion of saliva from the salivary glands, is partially, sometimes wholly suspended, and the acid mucus dries upon the tongue and teeth, forming sordes, with which the teeth are often coated for a considerable time.

This seems sufficient cause for the increased amount of decay so often observed following continued fevers; especially in young persons, and which is by them so often attributed to the effects of medicines.

Irritations and inflammations in the course of the alimentary canal are accompanied by an acid saliva. Although their course is usually short, their occurrence is quite frequent, and I have but little doubt that they have much influence in the inception of decay in the teeth of young persons.

Diabetes is always accompanied by an acid saliva, which is usually very marked. Leber and Rottenstein, in their recent work, contend that the acid reaction in this case results from the acetous fermentation in the mouth, of the sugar contained in the saliva in this disease. But Lehmann has drawn the saliva directly from the gland into alcohol, so that such fermentation could not take place, and yet he found it acid.

In irritations and inflammations of the uterus, the saliva is acid, sometimes markedly so. It is also very generally acid during pregnancy, frequently continuing during lactation. We have but little doubt but that this is the true cause of the increased decay of the teeth, which is so marked in pregnant and nursing women. The softened condition of the dentine renders the destructive process more rapid than it would otherwise be.

In dyspepsia there is much disagreement among authors as to the conditions of the secretions of the mouth. We think, however, that two forms of dyspepsia have been confounded, one presenting acidity, and the other the opposite condition of both the oral and gastric fluids, certainly we have found very opposite results in our own observations, both as to the condition of the saliva, and the effects upon the teeth; some cases showing very acid saliva, and the teeth decaying rapidly, while others show an alkaline saliva, and no decay is manifested.

Consumption is usually accompanied by acid saliva.

In thoracic inflammation there seems to be an increased alkalinity of the buccal fluids. Lehmann has always found them alkaline, while Wright and Jacubowitsch have sometimes found them acid.

In inflammation of the brain and nervous system, the saliva is alkaline.

So far there is a tolerable agreement among chemists who have made pathological investigations; but in most other diseases, the disagreement is so great that no definite conclusions can be formed.

The causes of habitual acidity of the saliva are not as yet understood. It seems to be in some degree an accompaniment of civilization; yet it cannot be a necessary result of our mode of life, as it is by no means universal. Cattle and horses, stall-fed, in close stables, often present it, while those that feed naturally do not. From the fact that we often find it to exist in certain families, every member presenting it, while others present it only occasionally, we are of the opinion that it is an hereditary anomaly, or disease, and that this is the true source of the hereditary nature of caries of the teeth. In all cases where I have found persons of forty or forty-five years of age, with a continuance of habitual acidity of the buccal fluids, without irritations of the mucus membranes, or other visible signs of disease to produce it, I have found their children presented it also.

Habitual acidity is also acquired in some manner where there is no such transmission, and may be of long duration. Many of

the cases are, however, temporary in their character, lasting for a few months, weeks, or even only for a few days, and there are, perhaps, very few persons who do not, at some time, present it. The greatest fluctuations are in youth, while in middle and advanced age examinations, from time to time, have shown but very little change.

We cannot now point out any particular quality of food that is certainly known to produce acid saliva without other marks of disease. Some few facts, however, seem to point to common salt as one of its causes. It is understood by our ablest zoo-chemists that a portion of the metallic chlorides are decomposed in the system, in some manner not yet understood. It is supposed that hydrochloric acid is one of the results, as this acid is usually formed upon the decomposition of the metallic chlorides in the presence of moisture. It is in this way that Lehmann and others account for the frequent substitution of hydrochloric acid for the lactic acid of the gastric juice.

A considerable portion of the chloride of sodium taken with the food fails to reappear in the excretions, and is therefore decomposed. Dalton places the amount thus lost at one-fifth. We have seen persons who, we have no doubt, would consume, in various ways, as much as an ounce of salt per day. A calculation shows that the decomposition of one-fifth of this would produce sixty grains, by weight, of gaseous hydrochloric acid.

With these facts before us, we have been induced to try some experiments with common salt. Our own saliva being habitually alkaline, and not having shown an acid reaction for several weeks, we commenced taking an additional amount of salt with our food, amounting to about one-third of an ounce per day. For the first few days the saliva showed a somewhat stronger alkaline reaction. On the evening of the third day it was about neutral, and on the fourth day it was distinctly acid. The salt was not taken after the fifth day, but the acid reaction remained for six days. Another experiment was tried with practically the same result. While these theories and experiments are not sufficient to prove that the free use of common salt is one of the causes of acid saliva, they

certainly give us good reason to suspect it, and it can be determined by direct and persistent experiment.

Acidity of the saliva is often accompanied by a scarcity of the secretion, and is probably, in some measure, due to a debilitated condition of the glands; yet in these cases any unusual excitant is apt to induce a superabundant secretion, which, in dental operations, is frequently enormous. In these cases we have generally found the mouth unusually dry, except when there was some special excitement of the glands, and the presence of food fails to excite the usual flow. Even where persons do not complain of dryness of the mouth, an examination reveals but little saliva, so that it often requires some little time to properly moisten a piece of litmus. Such persons are apt to suffer more than usual from thirst. This condition may be in some degree due to the habit of taking liquids while eating, thereby habitually relieving the glands of their natural stimulus of the presence of dry food in the mouth.

The treatment of acid conditions should not be passed without consideration, although nothing very satisfactory can as yet be adduced. Some agents have been found, however, that seem to give some promise of usefulness, although they have not as yet had sufficient trial for us to speak so decidedly of their merits as we could wish.

Acids, administered as medicines or taken with the food, produce increased alkalinity and increased flow of the saliva. Wright found that acids introduced into the stomach of the dog through a gastric fistula also produced this result promptly, and was led to the belief that one office of the saliva was to regulate the amount of acid in the gastric secretions. Experiments with alkalies, however, failed to produce acidity of the saliva; consequently this hypothesis was not maintained.

We have repeatedly found the saliva alkaline a short time after eating oranges and lemons, when it was known to have been habitually acid. But we have not made any very extended trial of the use of acids for the purpose of removing habitual acidity of the oral secretions. It seems, from what we have been

able to learn of their action, that their continued use, in large amounts, finally produce opposite effects, in diminished flow of saliva, thirst, dryness of the mouth, and finally acidity of the secretions. Not unfrequently, however, they produce salivation.

There cannot be much doubt but that the properly guarded use of acids in continued fevers is beneficial to the teeth, as they tend to induce a flow of alkaline saliva, by which sordes is neutralized and washed away.

The remedies we have tried most are black pepper, mustard, and armoracia, or horseradish. Either of these, when partaken of pretty freely as condiments, seem to change the condition of the saliva, when it is acid, quite promptly. Of the three, the armoracia seems to have the most decided action. We know of no valid objection to the use of either of them. They can therefore be alternated, as the tastes of the patient may dictate. I have prescribed them to be taken as freely with the food as the tastes would allow; while salt is avoided as much as possible.

One lady who had, in her two former pregnancies, presented a very acid condition of the secretions, and in each case quite a number of new decays, followed this course with the third. Her saliva was alkaline at the times when I saw her, and no decay made its appearance.

In another case, a lady about twenty-two, unmarried, who suffers much from disease of the uterus, and presents markedly acid saliva and much decay of the teeth, has succeeded in preserving an alkaline condition by this course, except at times, when, through sympathy, the stomach is too much deranged for her to take food. She has pursued this course for about ten weeks.

In most of the cases in which this treatment has been tried, the results have so far been favorable; yet we cannot say whether it will succeed in removing the constitutional anomaly of acidity, so that the remedy can be discontinued, and the alkalinity continue to prevail. If these, or other remedies yet to be found, will bring about this result, we believe caries of the teeth can be controlled with comparative ease. It will, of course, take consid-

erable time to demonstrate satisfactorily the usefulness of any such mode of treatment.

Sialagogues, so far as we have tried them, tend to promote a normal condition of the saliva. The same may be said of the tonic stimulants. Indeed, anything which tends to the promotion of digestion seems to induce alkalinity of the saliva. It seems probable, also, that some of the diuretics may be found useful. Anything which rouses the salivary glands to action seems to induce the elaboration of a normal secretion. Sudden shock, or the endurance of severe pain, as in operations in the mouth, usually induce a temporary change.

We have often noticed that the saliva would be acid before an operation, and alkaline afterward. How much of this may be due to the greater flow of saliva overcoming an acid condition of the mucus, we have not always been able to determine. In many cases, however, where we have examined the parotid saliva separately, we have found a change in that secretion

The *treatment of acid conditions of the mucus* arising from local irritations is sufficiently clear. All causes of irritation should, of course, be removed, and a healthy condition restored by the usual means. All overlaps of gold or other fillings about the gingival margin of the gum should be scrupulously removed, and the surface made absolutely smooth with that of the surface of the neck of the tooth, so that it cannot act as a mechanical irritant, always remembering that slight irritations are more likely to induce decay than decided inflammations, while the patient is much less likely to notice them.

The *cause of ropy, acid mucus* is not understood. It seems to arise spontaneously, run its course, and cease, after a longer or shorter period. If it continues long, the teeth suffer greatly. Those decays caused by it on the facial surfaces of the teeth are very difficult to arrest by filling, as the decay very often reappears by the side of the plug. Indeed, our experience has been that the whole facial surface of the tooth bordering the gum will inevitably be destroyed if this condition remains constant for a

considerable period. It is probably the most difficult form of decay to manage known to the dentist.

We have seen this condition arise and cut grooves across eight or ten teeth, disappear, and the decays turn dark—giving evidence of having become stationary within a few months; and again we have seen it continue for years. Again, it disappears only to return again after a few months, to again disappear and again return. Under my observation, it has but rarely remained constant for a very long period.

The thickened and slightly ingested condition of the membrane indicates the use of astringents in its treatment. We have, however, relied more upon friction, in the cases which have come under our care, and have found it very effective in removing it. We direct that the part be thoroughly and strongly rubbed with a quick motion, once or twice per day, either with a rough cloth or a pretty stiff brush.

DISCUSSION.

Dr. Kulp, Davenport, Ia., called the attention of Dr. Black to a powerful sialagogue, the xanthoxilum fraxinium, or prickly ash berries.

Dr. Wilson, Burlington, Ia.—During gestation and lactation, the condition of the saliva is changed. It is said that in stomatitis materna there is always an abnormal condition of the uterus. At the same time, the teeth are usually found in a deteriorated condition. As these abnormal conditions usually occur simultaneously, may we not conclude that they all originate from an impoverished condition of the system.

Dr. Judd, St. Louis, spoke in high terms of commendation of the paper, as it indicated labor and painstaking investigation. Hoped the time would come when test paper would be on the operating case of every intelligent dentist in the land. Has been

surprised sometimes at the results obtained with it. In the mixed juices of the mouth in the lying-in ward of the city hospital, at St. Louis, he found an acid reaction in nearly every case.

"L'Art Dentaire" is publishing a series of papers on the saliva, by a Dr. Vergnes, which he had intended to translate for the "Missouri Dental Journal," but as the articles are published slowly, and the whole is not yet completed, has concluded to await their completion before undertaking it.

Dr. DEAN, Chicago—In reference to Dr. Black's recommendation to lessen the quantity of common salt used as a condiment, in order to lessen the acidity of the oral secretions, did not consider the facts gained by a single experiment conclusive. The experiments of the essayist would tend to show that the excess of salt taken was not decomposed in the stomach. The fact that the oral secretions, for the first two days, after taking an increased quantity of salt, did not increase in acidity, would indicate that the excess of salt itself produced a disturbance in the digestive organs, as might an undue quantity of almost any inorganic substance, and this irritation might account for the increased acidity which appeared subsequently. If the kidneys were in a healthy condition, an excess of salt would be excreted without decomposition, and without entering the general circulation, and a larger quantity than is necessary for the gastric juice and bile, might be taken without producing any ill effects. Thought the quantity of common salt taken should be regulated by the appetite.

CARE OF CHILDREN'S TEETH, BETWEEN THE AGES OF SIX AND FIFTEEN.

BY P. E. WHITE, DAVENPORT, IA.

We all recognize the vast increase in number of our "little patients" suffering from disease of the dental organs, and, in consequence, one of the practical questions of the hour is—how shall we care for them? I do not propose to enter into the *whys* and *wherefores* of the diseased conditions of the teeth, but commence where I find my patient, and explain my practice as they come to me daily. The first question that presents itself to me is,—*Should the deciduous teeth receive the same care and attention as the permanent?* I answer, YES. Our creator evidently gives the deciduous teeth as important functional duties to perform as the permanent; and when we glance at the process of nature, and find certain laws in force, with such accuracy that we can determine the time of the eruption of the several teeth, both deciduous and permanent, we certainly ought not to question the goodness of Him who has pronounced all things good, but must acknowledge that all His works were made for a wise purpose, and to perform their particular part in life.

In order then that the question may be answered satisfactorily, let us look at the duty of the temporary teeth; we find that they are erupted at an age, and as rapidly as the system requires more solid nutriment, continuing its work until the full development of the teeth has been obtained; in normal conditions we find incisors, cuspids and molars, properly adapted and in perfect articulation;

they are then placed for mastication of food, subduing the solid elements, preparatory to being introduced into the stomach; giving space for the full development of the permanent teeth, and as the process continues and absorption takes place, it is even already contended by some that the elements contained in the deciduous teeth may be appropriated as nutriment in the formation of the permanent. The teeth give the child the use of speech, giving him advantages from the first, of learning right pronunciation, and when erupted at the proper age, oftentimes preventing the lisp which may be caused by a too free escape of sound. They also give a perfect contour of the face, producing symmetry and beauty of the features; in fact they are needed for the *perfect development* of the child.

The premature loss of the deciduous teeth, I think, occasions more injury to the dental organism than the loss of a permanent tooth after a full development of the maxillas. If then the temporary teeth are of so much importance, can there be but one answer, as to whether they should receive the greatest of care? Is there one among us to-day, but that would most strenuously oppose the unnecessary removal of a permanent tooth, however much it might be affected by disease, but on the contrary, make as earnest efforts in the opposite direction, saving the tooth for its proper function. Just such a stand do I take in regard to retaining the temporary dental organs intact, until by process of nature, the time shall have come for their removal, either naturally or by surgical means. I most certainly believe that the amount of injury being done to our young friends by neglect, through ignorance and wilfulness, is incalculable; and that every effort should be exercised, and all means taken for the preservation of their teeth, is one of the duties of the dentist; at no time in life do I consider that the teeth require the attention and care requisite for their future usefulness, as between the ages of six and fifteen; the great changes that transpire in the dental economy within that time, is simply wonderful, such as no student of nature can witness without exclaiming as did David, "I am fearfully and wonderfully made."

The design of nature was evidently perfect, yet how do we find it in our practice? In this degenerate age, when people do not live over righteously, we find the teeth of the young becoming carious at a fearful rate; and unless we bestir ourselves, and give the people a knowledge in regard to the subject, as is our duty, if I mistake not, there will be more mechanical dentistry to perform for the coming generation than has ever been done within the same time previously.

Our young people are coming to us daily for relief, already suffering with painful teeth, from vitiated conditions of the secretions of the mouth, tartar in all its various forms and chemical combinations, inflamed and ulcerated gums, oftentimes attended with a discharge of purulent matter from around the necks of the teeth—morbid state of the absorbents, these and kindred lesions of first dentition, should receive judicious management; above all no tooth should be removed only as a *dernier resort*, but should, if diseased, be treated and filled, that it may occupy in usefulness its allotted position.

The premature extraction of the teeth brings me to the point of *irregularity*. Within the past year I have examined closely mouths of many children and adults, frequently taking casts of such as were particularly interesting in regard to this subject; my observations thus far most certainly lead me to the conclusion that *improper treatment of the temporary teeth*, is as a *rule*, the *primary cause of irregularity of the permanent*.

A case in point:—I have in my possession, a cast taken from the mouth of a young lady aged nineteen, which exhibits the centrals overlapped, the laterals turned one quarter round, with their palatine surfaces pressing hard against the distal surfaces of the centrals—the right cuspid inside the palatine arch, while the left cuspid is outside, lying in almost a horizontal position, pointing toward the mesial line; the first bicuspids are wedged closely to the laterals, occupying the true position of the cuspids, while the molars are in their natural position. Learning the history of the case, I found that at the age of six, the centrals had been erupted, and that the laterals were forcing their way, causing considerable

pressure upon the deciduous teeth; applying to a dentist for advice and treatment, he extracted the temporary laterals and *cuspids*, hoping thereby to give plenty of space for the eruption of the coming laterals. He succeeded admirably, as the foregoing description, and a glance at the model will show. The great mistake made, was in removing the cuspids, for had they been allowed to remain until the age or circumstances warranted their extraction, or until sufficient expansion of the maxillas had occurred, I am convinced that no such fearful result would have followed. [NOTE: I would state that this case was most successfully treated, by the removal of the second bicuspid on the right side, and the first bicuspid on the left, when by the aid of proper plates and appliances, the teeth assumed a beautiful and symmetrical appearance.]

Says Prof. Garretson:—"If for one moment we refer to certain physiological relations existing between the first and second dentures, we may find that it is within our power to prevent the many ills that follow so frequently in this train, and simply by little or, more commonly, nothing. The deciduous dental arch is filled completely by its ten teeth. The permanent set is to comprise in number, sixteen, and each tooth certainly quite as large again as its predecessor. This increase in number and size of the teeth, it is evident must be provided for in an enlargement of the alveolar arch. This provision is always attempted by nature, in the process described by the physiologist as elongatory. * * * *In proportion to the number of deciduous teeth removed prematurely, will be the curtailment in size of that arch, at least of its alveolar face.*"

Much, however, must depend upon the skillful judgment of the operator in directing second dentition, and in order that success for the future may be assured, rather than to be hasty in our conclusions, let us wait till we have satisfied ourselves as to what results we are aiming to accomplish, diagnosing the case with care, and never thinking it lowering our professional dignity, by seeking the advice of a brother who perhaps may know more than ourselves.

The above may suffice, perhaps, to introduce the subject of prevention of irregularity of the permanent teeth, and as to how we shall proceed after the irregularity has already been gained, is a question with which we are all familiar; here ingenuity displays itself in the many various modes of treatment, appliances, &c., and where perfection can be gained, often restores mal-formed dentures to usefulness and beauty. I would raise just one objection in the extracting for treatment of irregularity, which to me seems of much importance; of course, judgment must be used in every case presented, but to me, the practice of some, who extract the first permanent or six-year molar, is exceedingly erroneous, and detrimental to the future formation of the maxillas. I have observed during the past, mouths where the molars have been extracted, where *proper articulation* has been wholly destroyed; in almost every case there has been space sufficient for a bicuspid, that there is no probability of ever being filled, and with the second molars pitching forward at a considerable angle, with its antagonizing tooth merely touching on a small portion of it, if at all; with such cases, had the second bicuspid been removed, there would have been plenty of room to have regulated successfully all the teeth anterior to them, while the antagonism would have remained perfect.

Now as to the general care of the teeth, during the ages I have selected. I find no better treatment than to follow strictly the common laws of hygiene; particularly do I urge upon parents the very great importance, in order that their children may have sound, healthy teeth, free from caries and pain, that there should be perfect cleanliness of the mouth and body, proper clothing, good substantial nutritious food, plenty of free, healthy exercise in the open air, and —rest. Whenever I examine the teeth of a child, I look closely to the condition of the six-year molars, so often mistaken by parents, as being the temporary teeth; and should the child's mother be present, I explain to her by charts and models, the great necessity that those teeth should be preserved, while the thanks that I have so often received for so doing

have been many, paying me better than any pecuniary consideration.

Recommend and urge to parents that the teeth of their children should be examined often, that they should, when found carious and diseased, be properly treated and filled, never omitting, when the parents or children are anxious to receive instruction on this point, to explain, as far as possible, in a general way, the process of first and second dentition, and the many diseases often attending them. I cannot better close this paper, than to show how diet and a regularity in life may affect the dental organism, and in fact the whole body.

I have lately been allowed to visit and examine the mouths of the children connected with the Orphan's Home, located near our city, through the courtesy of the superintendent, Mr. S. W. Pierce. Thinking that the natural and regular course of living among the children must exert a marked effect upon the teeth, induced me to make the examination, and the result was far beyond my most sanguine expectations. Here let me give a few statistics. The Home has been organized nearly nine years, during this time, over 1,100 children have been enrolled, largest number at any one time 585, there are now present 180 (the smallest number ever at the Home) boys and girls, whose ages are from five to sixteen years. Of the remarkable health of the institution, I need state but one fact, viz.: there has been but *one death* among the children since August, 1869. This is an extraordinary showing, and it would be well for all who are interested in the health of our children, and even of ourselves, to inquire into the reasons why, connected with it. 1st.—The Home is located on a charming spot, grounds elevated, and where plenty of pure fresh air can be obtained, and the sun has free access to all parts of the grounds. 2d.—Strict attention is paid to proper exercise, both of mind and body, and thorough cleanliness of the homes and the inmates enforced. 3d.—The children are regular and methodical in all their ways, whether in school, at work or play, eating or retiring. 4th.—Proper attention is required in regard to the diet, and herein, it seems to me, lies one of the great secrets of success,

and one, although we know its truths, yet are so loth to practice. It may not be amiss for me to present to your notice, a list of the articles of diet which is prescribed for the children.

BREAKFAST.

Sunday—Baked beans, brown and white bread and butter.
Monday—Boiled milk, bread and syrup.
Tuesday—Meat stew, bread and syrup.
Wednesday—Baked beans, bread and butter.
Thursday—Boiled milk, bread and syrup.
Friday—Boiled potatoes, bread and butter.
Saturday—Meat stew, bread and syrup.

DINNER.

Sunday—Cold meat, pickles, bread, butter, cheese, apples and pie.

Monday—Vegetable soup, cold slaw, corn bread, butter and apples.

Tuesday—Potato soup, pickles, rice and syrup.
Wednesday—Hash, onions, bread, butter and apples.
Thursday—Noodle soup, baked potatoes, bread and butter.
Friday—Bean soup, rice, or hominy, apples and syrup.
Saturday—Hash, onions, bread and butter.

SUPPER.

Sunday—Luncheon of cake and fruit.
Monday—Bread and butter or syrup.
Tuesday—Bread and milk and gingerbread.
Wednesday—Mush and milk.
Thursday—Corn bread and butter or syrup.
Friday—Rusk, bread and milk, and gingerbread.
Saturday—Bread and milk.

Other fruits and vegetables in their season. Drinks—milk and water.

Upon a diet like this, for seven or eight years, and with the regulations required, our theory would be that the dental organism would, or ought to be, perfect. Now as to facts,—to my great

surprise, knowing the average condition of the teeth of children in the city, in the large number of oral cavities examined, I did not find but three or four temporary teeth at all carious. I found the process of first and second dentition taking about its ordinary course as to time of eruption, yet, if anything, second dentition was retarded somewhat, owing to the extremely firm and solid material contained in the temporary teeth. In my further observation, I found but two or three of the permanent teeth at all decayed, excepting in one little girl of a scrofulous or syphilitic diathesis, who had been in the home only two years, when the six-year molars were carious to quite an extent, the crowns to three of the teeth being entirely gone.

The cuspids, bicuspids and second molars of those examined, and especially of those who had been in the Home for six or seven years, were most beautiful, exhibiting that strong, healthy texture in appearance, that indicates perfect development of the tooth structure.

I learned that the children seldom, if ever, used a brush or pick upon the teeth, and yet salivary calculus was not present to any great extent, except in a few who were suffering from hereditary or constitutional disease; but this,—uncleanliness of the mouth and teeth—was the only thing to mar the beauty of the whole, otherwise, picture to yourself how teeth, and in fact the children themselves should look, living under such a regimen, and you have it fully exemplified in the children now at the Orphans' Home. Much credit must be due the superintendent, matron, and assistants, for the thorough manner in which the common hygienic laws are observed, in the valuable institution over which they have charge.

The lessons that I have learned myself, from my visit to the Home, have been many and valuable; and perhaps the greatest is,—if I would wish to live long, and free from the many ills and sufferings of life, proper and strict attention should be given to exercise, cleanliness, diet and rest.

DISCUSSION.

Dr. Low, Chicago—Has examined the teeth of the children in a similar institution, to that in which the essayist made his observations, and was convinced that the matter of plain and nutritious diet was all important. There was only one child with poor teeth in this institution, this had the same food as the others, but it had the measles at the time of formation of the teeth.

MECHANICAL DENTISTRY.

BY WM. O. KULP, DAVENPORT, IOWA.

This old term, "mechanical dentistry," has in it a tingle of odium to many good men in our profession. I can't blame them for it, for are we not a step in advance to a mechanical trade, and does not the term smack of a trade rather than a department of an educated, scientific profession, as ours claims to be? We, therefore, want those in our societies to feel that they have a much weightier responsibility than they would have were they members of a "trade union." We would not willingly hear surgeons called "mechanical doctors," or surgical appliances "mechanical medicines," yet it would seem just as elegant as to say the "mechanical dentist," or "mechanical dentistry." The term is not inappropriate in either case, for there is much mechanical skill required in the performance of the various operations in each specialty; still it does not sound professional. I, therefore, propose to christen the department of our profession anew, and call it *artistic dentistry,* instead of mechanical dentistry, believing the term to be more appropriate and professional, and it, therefore, will be more acceptable to the profession. It may give the specialty a new standing in the eyes of professional men, and men employed in it may be stimulated to greater efforts to achieve for their department that higher position of perfection which we all so much long to see it occupy.

The artistic dentist should be by nature endowed with much inventive and imitative ingenuity and patient perseverance. He should be a judge of colors, light and shade, form and size, and

should have the acquired knowledge of anatomy, physiology, chemistry, natural philosophy, and enough of surgery and general medicine to be able to treat successfully diseased conditions of the mouth, and extract teeth. Let this be the standard, and our profession will not be borne down by its odious members, and humanity will derive the full benefits of this merciful calling. Then the day for impostors and impositions emanating from our unworthy adherents will cease. There perhaps never was a time in the history of our profession when this department was more in a tumult than it is to-day—beset on all sides with patents, patent medicines, patent instruments, patent appliances, patent bases, etc.—some good, some indifferent, others wholly worthless —humbugs. It would take a fortune of money, and all the time at our command, to "keep the run of," and try all the new things that clamor for admission into our patients' mouths and into our laboratories. A few of the most worthy I will consider, aiming only to open the discussion upon this whole subject.

What are the requirements of the substance upon which to mount artificial teeth? I answer briefly:

1st. It should be a substance wholly harmless, therapeutically or chemically, to the wearer.

2nd. It should be impervious to the secretions of the mouth, either in a vitiated or normal condition; also to all chemical agents that are likely to be taken into the mouth, either as food, luxury or medicines.

3rd. It should possess sufficient strength, with the least possible thickness, and at the same time should be malleable or plastic enough to admit of being used in building out the absorbed alveoli to any desired thickness, without becoming too heavy and bunglesome to be worn by the patient with comfort.

4th. It should be the natural color of the gums and vermillion border of the lips; this should be capable of being deepened or lessened, as each case might require, as no two persons have precisely the same colored gums.

5th. It should be cheap, so that the poor can avail themselves of the comforts and necessity of artificial dentures.

This leads us to the inquiry, what have we in the profession to-day that "fills the bill"? Echo answers, what? Is gold plate the substance? It has the first two requirements, but there it ends. In combination with rubber, it has another, and I believe is most entitled to the palm of any material in the profession to-day—except cheapness, when rubber alone is the best of all cheap bases, while its rivals—gutta percha, coralline, piroxyline—are attracting much attention, mainly because of the dark and lowering cloud overhanging the rubber question. They are not equal to the race thus far, for their objections are much more numerous,while their advantages are not worthy of mention. So far as beauty and strength are concerned, Dr. Allen's continuous gum-work excels all other substances in the profession. But whoever succeeds in overcoming the few serious objections to the porcelain base, in limited use, will set his name by the side of an Arthur, Atkinson and a Barnum, for we have nothing that approximates so nearly to the *ne plus ultra* as does this substance. Who will be the genius? To whom shall we render this honor? Nations will rise up and call the successful one blessed. I do not mention silver and the metal compounds offered to the profession in these days, for I do not consider them fit to be put into our patients' mouths.

DISCUSSION.

Dr. Crouse, Chicago—Not only in the mouths of the public, but also in those of dentists, we frequently see displayed a gross disregard of color, shape and expression in the arrangement of artificial teeth—this, inasmuch as it may be an argument in favor of the preservation of the natural teeth, with the public may be a beneficial state of affairs. If the profession felt the interest it ought, the subject would not be looked upon as a bore. We cannot serve our patients best in this way, nor elevate the profession. Artificial teeth should be works of art, and aim at restoring the orig-

inal expression, by color, shape and arrangement of the teeth. The features should be restored. The proper means can always be obtained, if not at hand, if we only know ourselves what we want.

Dr. JUDD, St. Louis, is neither a mechanical nor an artistic dentist; has no prejudice against that department of dentistry; has heard appeals for the last eight or ten years to elevate this branch to the rank of the surgical. It cannot be made to occupy the same position, and those who do not receive as adequate reward in this as in the other departments will abandon it for the other. In large cities the main profits come from the manipulative part, and it will soon be so in country towns. You are obliged to compete with your $5 or $10 men. Almost all the rubber work goes to these offices. Our old patients do not require much mechanical work, and our younger ones scarcely at all, unless in cases of absorption of alveoli. Our best talents all go in the direction of the operative department, and all efforts to elevate the mechanical to its level will fail.

Dr. KULP, of Davenport, while partially agreeing with Prof. Judd, is afraid that just such remarks coming from such a man will do much to discourage mechanical dentistry. The manner of a calling greatly affects its success. Knows of men who insert artificial dentures, receiving pigs and chickens as pay. *Mechanical* dentistry to-day does not stand as high in popular esteem as it did five years ago, and people are more willing to pay for *artistic* dentistry.

Dr. KITCHEN, of Galva, Ill., lives in a small town. Mechanical dentistry is on the decline, as well in small towns as in large ones, and all younger operators are laboring to advance the operative department. A gentleman present has in his pocket twenty-six sound teeth extracted by an *artistic* dentist.

Dr. HONSINGER said continuous gum was the highest style of artificial work, but that its expense and liability to breakage was an objection to it. Rubber, when properly manipulated and

artistically arranged, makes a very fine substitute. Gold is objectionable on account of the interstices between the teeth and plate, which serve as a receptable for food. This, however, can be avoided by the rubber combination. Great care in antagonizing the teeth should be taken. The locking of the cusps of the bicuspids is generally disregarded.

Dr. KINGSLEY, Freeport, Ill.—Where the upper jaw is prominent and the lip short, plain teeth mounted in pink rubber present a finer appearance than block teeth, although, after a few years, this rubber will have lost its fresh, life-like appearance, and require renewal.

Dr. BLACK, Jacksonville, Ill., said it was a great mistake to think that to separate the two branches of dentistry would be degrading to the mechanical. He thought it would elevate both, as one could better excel if all his energies were confined to one of these branches. Ten years ago ninety per cent. of our work was mechanical, now ninety-five per cent. is operative. In large cities many operators have given up the mechanical branch altogether, and a class of men will do the mechanical work who, on account of being exclusively occupied with it, will do much better.

Dr. INGERSOLL, Keokuk, Iowa—The difficulty in the case is not touched by *calling* it artistic dentistry. Calling it, does not make it so. Artificial work should restore lost features, reproduce the personal identity as it existed before the loss of the teeth—as the painter does with pallet, paint and brush upon canvas. In order to do this, art and mechanism must be combined. As the comparative anatomist is able to determine from one bone the shape and size of the others belonging to the skeleton, so we should be able, from even one remaining tooth, to judge the characteristics of the lost ones. Fleshy men commonly have light bony frames, small hands and feet, and require small teeth; thin-fleshed, lantern-jawed people, shovel-shaped teeth, broad at cutting edge and with narrow necks. Color should

match remaining teeth, unless these are abnormally discolored. They should harmonize with the complexion, hair and eyes, otherwise they will disfigure. The voice should be restored. He made a set of teeth for a clergyman with very flat arched mouth, requiring very long teeth, on a gold plate. The backings of the teeth formed a right angle with the plate, and patient complained of a whistling sound when speaking. Reduced the angle by filling in with block tin and soldering iron, and remedied the difficulty. With rubber this matter is easily managed.

THE ELEVATION OF THE DENTAL PROFESSION.

BY C. STODDARD SMITH, SPRINGFIELD, ILL.

The elevation of the profession—what is it, and how is it to be accomplished? These are the questions upon which we propose to offer a few remarks for your consideration. A correct answer to them would of necessity cover a wide range of topics, and we can only touch upon the most prominent of them.

By the elevation of the profession, we mean to raise the standard of qualification of its members as regards integrity, skill and education; and by so doing, to enhance the just estimate in which we are held by the public in general and by the communities in which we dwell, in particular. Much has already been done in this direction; but that much remains to be accomplished in the future will not be disputed by those who study the position which the members of the profession occupy at the present time.

It is an axiom that water can rise no higher than its source. It is equally true that the standard of a body can be no higher than that of the individuals composing it. The Prussian army has attained its commanding position in military matters by the systematic training which each of its soldiers receives, running through long years of time, and always keeping in view the one end,—the making of a thorough soldier. So it must be with us. We can only succeed in elevating the general mass of the profession by setting up some standard, an ideal one if you please, but yet a real one, and keeping every individual eye set upon it, and bending every individual effort to attain to it. It is

not our purpose to repeat the fulsome self-laudations in relation to our astonishing progress from the date of our birth in the humble cradle of the mechanic arts, almost within the recollection of our older members, up to a recognized standing among the learned professions; nor, on the contrary, would we look upon the dark side of the picture and pronounce the whole professional fabric a fraud and a delusion; but pursuing rather the golden mean, we would, while rejoicing over the achievements of the past, recognize the failings of the present, and endeavor to find a way to avoid and rectify them in the future. With these general remarks then, we proceed to more specific consideration of the subject.

In doing this, we may perhaps reach our end more clearly if we narrow the question down to our individual selves, and ask, how can *we*, how can *I*, elevate the profession which we have chosen, to which we have given our lives, and to which we look for support? It will not be denied that the first quality necessary to enable us to do this, is a fitness by nature, by education, for the position we desire to occupy. Many of us are deficient in one of these. Those who have preceded us were in rare instances only, fitted by a proper preliminary education for a position in a professional body; all honor to those, whether in the past or present, who have overcome this great obstacle, and in spite of it and others, have risen to eminence by sheer industry and perseverance. But let us understand that the day for such vaulting has passed. In these days of high schools and colleges, when education is free to all, let no one think that he can enter the arena of our profession and rise to a commanding position in it, without a fair education, in at least his mother tongue; for the day is not far distant when the people will recognize the difference between the true scientific and professional practitioner, and him whose only qualification is a certain manipulative ability. The professional edifice must have a solid foundation in a good education, and must rise story by story, and stone by stone, till in full completion it stands forth a symmetrical whole.

Let me here adopt the negative argument, and attempt to point

out a few things which we must *not* do, if we would elevate the profession. Prominent among the things to avoid, we would mention the practice of decrying or villifying other practitioners. Such practices, we are satisfied, can do no good whatever; the people pay little or no attention to our wholesale condemnations; they say: "of course, he will run him down; two of a trade can never agree!" Very likely indeed we shall overshoot the mark, and our efforts to prejudice our patients against some competitor, will only result in giving him notoriety, and prejudicing our auditor against ourselves. If we can say nothing good of our neighbor, the most suitable, as well as, in the end, the most effective plan, is to maintain a dignified silence. Of course, if operations or results are submitted to us for our opinion, we must pronounce upon them honestly and in accordance with our judgment, but even then a mitigating remark or two, if we can make it conscientiously, will be effective in convincing our patients that we are not condemning merely from habit, or a love of doing so.

Then again, if we would elevate our profession, we should avoid all attempts at underbidding each other in the matter of our fees. I know that this is a hard matter with many, and to some, particularly in the smaller towns, it may seem that their very existence depends on being able to secure patronage by following the commercial maxim of "Quick sales and small profits." But such competition is ruinous to our standing as a profession, and in the end detrimental, I believe, to our pecuniary interests. Four years ago the Illinois State Dental Society met in a city on the banks of the father of waters, a hundred miles or so south of this; and then and there we were shocked to find the city full of handbills bearing the appearance of those issued by a traveling corn-doctor, or a retail grocery, emanating from some of the rival practitioners of our specialty. The effect which these things have upon the public was well illustrated by a remark made to us at the time, by a citizen of that place, preceded by the statement that "the dentists were running one another pretty lively." "Oh, yes," he said, "all the trades have to do that once in a while." "The *trades*," you see. We are at once sunk in popular estimation to

the level of the striking mechanics of which we hear so much. The trades may strike if they will, and contractors and manufacturers may properly bid against each other, but let us maintain our professional dignity by fixing our fees at what we consider a just standard, and then refusing to lower that standard for the sake of patronage. The bad effects of this practice do not end with what has been mentioned. Lowering of prices invariably leads, sooner or later, to a lowering of the character of operations; for though a man may for once do a certain amount of work for less than a fair compensation for the sake of securing the work, or of getting up a reputation, yet he will soon find it impossible to continue to do so. He will, whether conscious of it or not, have a secret feeling that he is to be underpaid, and cannot afford to take the pains without which no operation in dental surgery can be properly performed; thus the character of his operations will deteriorate, and he will be doing what he can to lower, rather than elevate the standard of the profession. No, let us rest assured that the people will demand of us the best we can offer, and that most will be willing to remunerate us for such services. And here let us remark incidentally that if we would have people regard us as a profession, we must show them that we regard ourselves as such; not by a pedantic air of disdain toward our supposed inferiors, but by the maintenance of a proper professional dignity, and care in the use of our language, avoiding all such terms as "getting a job," &c., which savor of the workshop and the realms of the artisan.

Then again, we should not resort to extensive and high-sounding advertisements. Let our advertisements be *walking ones*, which pay us money instead of drawing upon our pockets. An intelligent gentleman, connected with a newspaper, who was endeavoring to secure our patronage in the shape of an advertisement, was soon led to confess that he himself would have more confidence in a dentist who did not sound a trumpet before him by a long advertisement in the papers than in one who thus paraded his claims before the public. A simple card, with name and busi-

ness, is proper of course, but much more than this will tend to degrade rather than elevate the profession.

Now to return to the positive side again. One of the most important matters to which our attention can be called is that of securing the confidence of the people. And this not only as dentists, but as men of honor and reliability. What would be the standing of a lawyer or a physician whose opinion and advice, if followed, should be found constantly leading to some other result than that predicted by him? Necessarily the people would lose all confidence in him. He might mean well enough, and ignorance be his greatest failing, but the result would be the same. It is so with us. Let us make it a rule never to tell people "for certain" anything which by any chance may turn out differently. Let them know by experience that when you tell them a thing is or will be all right, it *is* all right; and not till it turn out that it was all wrong. Sustain your reputation as a dentist of skill, and a gentleman of honor, integrity and entire reliability, by a thorough understanding of the ground upon which you tread, and a careful regard for the contingencies in your statements and predictions. Of course we cannot give a correct opinion, when our knowledge is not sufficient to warrant it; but it is our business to know when we can be positive and when we must be guarded. Although we find occasional intricate and difficult cases, yet the great mass of our practice is comparatively plain sailing to one who is a competent navigator in these waters; and we have no business not to be competent if we undertake to place ourselves before the public as professional men. Do not tell a patient that an aching pulp, under a filling you have inserted, is only a result of "catching cold in the tooth;" or that a set of artificial teeth which do not fit properly, will "come all right." You may probably get rid of the patient for the time being, by such a course, and save yourself, it may be, a good deal of work, but very likely you may find that you have not only got rid of him temporarily, but permanently, and with him, of all who come within the reach of his influence. If there is any one thing more than another, which will tend to elevate a professional man in the estimation of

the community, it is to have them *know* that his word and his judgment, when he gives them unconditionally, are absolutely reliable.

The *literature* of our profession is a department in which much may be done to elevate it. We would not decry what we have; but it is apparent to all who examine the subject, that although much of value is found in our standard works and current periodical literature, yet a great proportion of the latter, at least, is of comparatively little value, to say nothing of its inability to stand any test whatever as literary productions. We should be sorry to have our profession judged by a well-educated critic, on the basis of the mass of the articles which appear from time to time in the journals. It is not strange that this is the case, since many of the best men, as a matter of fact, either through modesty or want of time, do not write for publication. Many articles are apparently written only from a morbid desire to appear in print, and not from a desire to convey some useful information and instructive thought. When the article contains these, we can easily overlook literary defects; and yet if we would lay claim to a position as a learned profession, we certainly must improve this most important index of our real character. Let no one be discouraged by these remarks from any effort to write for publication, or for these meetings; but rather let us make what we have to say a matter of study until we are able to say it in a concise and effective manner, so far as in us lies. Our literature in general is far too diffuse. We waste too many words in attempting to convey ideas. These last are what we want, culled and sifted, boiled down and double-distilled. I venture to say that all that is really valuable in a year's issue of our journals could, by proper labor, be condensed into a tenth of the space it now occupies.

Let no one misunderstand our purpose in these remarks, or mistake the spirit in which they are made. They are not personal, nor are they intended to be cynical or hypercritical. They are designed simply to point out our defects, that we may set to work honestly and sincerely to remedy them, which we can never do unless we clearly discern what they are. We do not

desire to occupy the position of a Ruskin in the profession, deriding all that is, villifying all that has been, and pointing to an ideal creation of our own fancy, whose attainment is not within the power of mortal man, and whose non-attainment is to be accounted utter failure. Not this; but we would still have an ideal—one toward which we certainly can make progress, if we cannot quite attain to. We would have each member of the profession to remember that with many people the word dentist represents a genus; that whatever *we* do to elevate the standard of estimation in which we are held, will, in some measure, have a bearing on the standing of the whole profession; and that on us, in the same measure, rests the work of professional elevation. We would have no one rest satisfied with his present attainments, whether as an operator, a contributor, or an educator; but we would have each one constantly aiming to improve his condition by increasing his knowledge, his skill and his reputation, by using not only his fingers, but his brain. Our profession demands of us not only a manual dexterity second to that of no other calling; but a position among professional men, no less than a proper discharge of our daily duties, requires a constant use of our intellectual faculties far different from that exercised by the mere artisan, whose skill in his processes may nevertheless, perhaps, be equal to ours.

The dentist should not only be educated himself, but he should be able to educate the people. Indeed, our position as educators involves, perhaps, some of the most important and difficult duties which we owe to the public. It is a comparatively short period since we were regarded by intelligent people as pursuing a *trade*, not a whit superior to the barber's; and many people are now to be found who look upon us with these or similar feelings. It is a difficult matter to be able to reach these prejudices, and yet we are called upon to do it, and we can do it. The process is necessarily slow, but it is sure.

We may also exert an influence upon the future of the profession, perhaps greater than any which we can exert upon its immediate present, through the medium of those who will enter its ranks

and succeed us. When we are applied to to take a student, let us remember that here is an opportunity to mold the character of our profession. Let us not be influenced in this matter by the paltry consideration of any remuneration we may receive for our instructions. Let us first ascertain whether the candidate is a suitable person for a practitioner of our specialty. He may be smart enough to make a good doctor—that is, he may have a good head—but he may have no hands, and thus he would never make a dentist. He may be ingenious, yet with hands alone he could never make a proper person to entrust with the care of the dental organism; or he may possess both, and yet be so deficient in moral principles that he would be an unsafe guide in matters in which his pecuniary interest might come in conflict with the best good of his patient. And, as we said before, the dentist of the future must have sufficient education not to make himself ridiculous in the eyes of intelligent people, not to say professional men, by a misuse of terms, and an ignorance of those things which are within the reach of every boy.

Dental legislation may be a means of elevating the profession in the future; though, to our mind, it is a far less powerful means than some of those which we have enumerated. To require that all hereafter entering our profession shall avail themselves of the opportunities offered by a dental college, and be a possessor of its diploma, will undoubtedly do something towards raising the qualifications of our new recruits; but until the colleges themselves cease to graduate those who are neither by preliminary education nor dental knowledge, fit for a position in our ranks, we cannot expect much from this source. But let us demand from the colleges that they shall elevate their standard, and let us hope that they will continue to do so until it shall not be, as it has been, that a diploma shall represent only so much money paid to the faculty, and not even an attendance upon a course of lectures, to say nothing of passing a suitable examination. A desire to possess a diploma is right and proper; it is the crowning reward for our years of study, and we pay for it usually with great readiness; but let us remember that the mere parch-

ment is no talisman to enable its possessor to attain success in the performance of his difficult duties, and that the knowledge it is supposed to represent would be far more valuable without the diploma than the diploma without the knowledge.

A high standard of operations is of great importance in maintaining and elevating our profession. It is probably well known to all present that there are many who argue that because they have had their teeth filled, and it has been only a waste of money, or, perhaps, worse, therefore dentistry is a failure and its practitioners are humbugs and imposters. Strange as it may seem, otherwise intelligent people occupy this ground to-day. It is ours to show them their mistake, and to make them understand not only that "a stitch in time saves nine," but that in the majority of cases nothing is more certain of accomplishing its purpose than really good dental operations, performed in a judicious and timely manner, are to preserve the teeth. It is as obvious that this is an important means of elevating the profession in the estimation of the community, as not only a useful one, but as an important and even indispensible auxiliary, in these days of degenerate teeth, to health, comfort and well-being, and that an ignorant or imperfect performance of operations has a strong tendency to degrade us before the community; that it is not necessary to do more than barely allude to it, and to urge every one not to allow any of the "*that-'ll-do*" sort of work to go forth from his hands. And lastly, we may do much to elevate our profession by such gatherings as these. Let us encourage and sustain them. Let us make it a duty to attend them, and contribute our mite to their interest and usefulness. Most of us are rusting all the year, so to speak, for want of contact with others who are pursuing the same path with ourselves. Perhaps we are isolated from others, or worse still, perhaps petty jealousies prevent us from associating with those of our immediate vicinity. But here we meet to impart and receive; here our professional ambition receives an impetus by witnessing what others are doing; here we are certain to gain new ideas, and even if we are ever so humble in our opinion, it is not at all certain but what

we may be able to say or do something which will prove helpful to some one who may be far above us in many things. However much the critic may ridicule our meetings, however much the carper may find fault with them, if there is any progress—if there are any elevating influences anywhere, they are to be found here. So let us not fail, year by year, to come together to compare our year's experience, to gain new ideas for the future, and to throw at least the influence of our presence in favor of those efforts which have already done so much to elevate the dental profession.

DISCUSSION.

Dr. Davis, Petersburg, Ill.—It is a gratifying fact that American dentists, as operators, stand in the front rank, yet we are indebted to European observers for all our scientific facts. This ought not to be so; our prominent men should devote themselves to the investigation of questions purely scientific. We are too lenient in the arrangements with our students, and not careful enough in our selection of them; was glad of the step taken by the Illinois State Dental Society in this direction during the present session. In Europe, medical and dental students have a longer period of pupilage, hence their scientific attainments are superior. Only young men with good moral character and fair educational preparation should be taken, and then it will not be long before we will occupy the same position of our older brother, the medical profession.

Dr. Kulp was surprised that such a body should lay upon the table a resolution of this kind.* There is no honor in holding the degree of M. D., or D. D. S., if it can be obtained too easily; and every dental and medical society should place itself on record in opposition to granting degrees without attendance to full courses of lectures and satisfactory examinations. But this evil would prevail so long as our institutions are not endowed and have to consider pecuniary advantages.

* See resolution on pages 33 and 34 of Joint Minutes.

PREVENTION AND TREATMENT OF DECAY ON PROXIMAL SURFACES OF THE TEETH.

G. H. CUSHING, CHICAGO.

In the consideration of the subject assigned to me upon this occasion, I do not expect to offer you any new ideas or method of practice. I desire to emphasize some already well-known points, and shall endeavor to place before you such facts and reasoning as will tend to throw light upon this important subject, and to enable you to judge of the probabilities of arriving at more successful results through other means than those now generally employed. My aim will be *toward* establishing some rational method upon which the profession may, by and by, unite with genuine conviction of its propriety and superior advantages.

This would seem to be a most desirable state to arrive at, for we, as a profession, have now no settled standard of practice in scarcely any one particular. This could not well be otherwise in the newness of a profession like ours; but the time seems to me to have arrived when we should begin to see the crystalization into something like definite form, of the various methods, plans and procedures which have characterized our practice up to the present time, as the result of either original thought, or of observation and lengthened experience. In order to reach this desirable end, we must put aside any bigoted adherence we may have given to this or that practice, and come to the investigation of our subject, determined to give heed only to that which has been fairly tested by experience, or in the absence of that, which will bear the most thorough criticism of reason and philosophy.

The subject, as stated, is divided into two distinct branches. The first looks only to prophylactic measures—*i. e.*, to the means of prevention. For the proper understanding of this, it is essential that we should define what is, in this paper, understood to be the etiology of dental caries. Without discussing the various theories which have been advanced from time to time, it will be assumed that, although the immediate process of so-called caries is unquestionably a chemical one—being the reaction of an acid upon the lime salts of the tooth—yet that such reaction would not take place, were it not for some constitutional abnormality which impairs the vital force to the extent of weakening the power of resistance to destructive agents, which is inherent in the teeth. Taking, in connection with this, the imperfect constitution of the teeth as a predisposing cause, and I think we have the fundamental elements of the etiology of dental caries. In support of this assumption, we must consider man in his original, primitive condition, when his organization was supposed to be perfect. I take it for granted that the following proposition must be universally accepted as correct, viz.: that there was a time when the animal part of man was perfect in form, development and function, and that when living out such a life as would seem to have been intended for him, his teeth would, at its close, present no indications even of what we now know as dental caries. I assume as equally incontestible the position that his teeth, during all his life, were constantly subjected to contact with acids of various kinds—those of fruits, which then, as now, in certain localities, formed the principal part of his diet—and to those produced in the mouth by the processes of fermentation and decomposition, which processes must take place in the mouths of those even in perfect health.

These premises being granted as sound, force the conclusion upon us that the teeth have, in the natural order of things, the power inherent in them of a certain resistance to destructive agents.

Now it is by no means certain that the teeth of men of the present day are subjected to contact with acids to any greater

extent than were those of the original man, or that these acids are more powerful in their destructive agency than were those of that earlier time, and yet decay of the teeth is the universal rule at the present day, and probably co-extensive, throughout the world, with the history of civilization. These propositions being thus far granted, we have established the position that the present generation are characterized by an almost universal condition of weakened vital force, as evinced in the proneness of the teeth to succumb to the attacks of agents which, under fully healthy conditions of the body, ought to have no effect upon them at all. The part which imperfect constitutional structure plays in the matter, I do not regard as of great importance; and this condition is chiefly to be noticed as favoring a more rapid destruction of the teeth, where caries once commences. I think the fact of imperfect organization of the teeth, which is often apparent, furnishes a strong support to the first assumption "that caries is mainly dependent upon constitutional causes, which tend to impair the power of resistance of the teeth to destructive agents;" because we often see in the mouths of certain individuals teeth which are evidently of imperfect character, being less dense in structure and showing imperfect fusion of the enamel at the fissures and depressions, which yet remain undecayed, or decay only to slight extent, although subjected, so far as we can ascertain, to the same destructive agents, which rapidly disintegrate teeth of even better quality in the mouths of other persons.

These phenomena can only be accounted for upon the theory that there is in one case a resistant force at work independent of local conditions, which is absent or held in abeyance in the other. One other fact may be cited, as tending to support the theory here advanced—and that is, the greater tendency to, and more rapid progress of, caries at certain times in the same mouth, and even in the same teeth, as particularly noticed in the case of pregnant women.

Now, it will very properly be asked, "What is the *cause* of this constitutional disturbance, which thus weakens the power of resistance in the teeth?"

The only reply which would seem to be possible to this query, in the present condition of our knowledge is, impaired nutrition.

Vague and indefinite as such a reply must be, it yet probably conveys as intelligible an idea as any more elaborate one would do, and probably as nearly expresses the truth. Back of this, again, comes the inquiry, why this perverted nutrition? To this we can only answer, because of disobedience of nature's laws, in almost every particular. I need not elaborate this point. Every man is conscious that not an hour of his life passes, in which he does not violate some law of nature, setting aside constantly the simplest teachings of common sense for the gratification of appetite, or as a matter of convenience, or from the influence of long-continued habit, or from indolence.

To this violation of "Divine law" are to be traced "all the ills that flesh is heir to."

This brings us to the starting point of our subject, that is the consideration of the first means of prevention of decay. It might appear at the first glance, if we accept the foregoing premises as sound, that the prevention of disease would be easy of accomplishment, provided we could induce men to become obedient to law, and to submit themselves to the teachings of hygienic science. The extent of improved bodily and mental condition, which such a change in the order of things would secure, can never be estimated. It would of course be immense, but even were it possible to induce such a change, we should find the benefit to the teeth for a long time after such a revolution was effected, to be comparatively slight, for the effects of inherited disease and increasing degeneracy, extending through many generations, could not be overcome at once, and while the general condition of the body might be made to more nearly approximate health, yet the teeth would be found still to be imperfect, and to be continually yielding to destructive influences.

Theoretically, this treatment should secure the end sought, but practically it would not. Now we must not look at this subject from a purely theoretical standpoint. One of the most important things for us to bear in mind, in attempting to understand subjects

connected with the prevention and healing of disease, is that we must recognize the fact that we have to take things as we find them, and to deal with them accordingly. We know that men will continue to act contrary to the teachings of reason, though assured that the penalty must be paid; that however fully we may succeed in convincing their reason we shall fail to control their actions to any great extent, and yet that they will expect us to afford them relief from suffering, whether induced by their own acts or otherwise. This relief we should be prepared to give to the fullest possible degree.

So, while we must accord to hygiene all that is due, and must use our utmost endeavors to try to lead men into accord with its teachings, we must not ignore the self-evident truth that our efforts in this direction can be of but slight avail.

In view of these facts, we are compelled to seek relief from other sources.

The question then presents itself, what means have we other than those already considered through which to secure prophylaxis? It has been affirmed that the principal cause of dental caries is to be found in a lessened power of resistance to destructive agents, due to constitutional disturbance arising from perverted nutrition.

Can we then, after having secured on the part of our patients the fullest possible compliance with hygienic laws, and having failed to secure the results to be desired, hope for further benefit from constitutional treatment?

It has long been my belief that the time would come when it would be possible to secure partial relief at least by means of such treatment. We must remember that very little comparatively, can be hoped for from our teaching of hygienic laws, and if it is possible for us to supply nature's deficiencies or counteract the influence of disease by means of medication, or by the administration of concentrated or artificial food, we should leave no effort untried to establish a practice in this direction, which may be relied upon as efficacious and safe in a majority of cases.

It is somewhat surprising, and much to be deplored, that no

more has been attempted in this direction by men who are qualified for such experimentation, for it is unreasonable to suppose that with the advanced knowledge of the present day to guide us, and with the resources of chemistry at our hand, no means could be found which would aid us in our endeavors to anticipate disease. It is true that the use of the phosphate of lime has been advocated to some extent, as a prophylactic. Dr. Wescott and Dr. Watt, I believe, have both advocated its use, and claimed that its administration at their hands resulted in marked benefit to their patients.

But the generally accepted views of practitioners of the present day, both of dentistry and general medicine, deny the value of the treatment as a general rule, where the crude phosphate of lime is administered, as it is claimed that it is not taken up by the circulation, that it is insoluble, and is carried off in the excretions unchanged. An article in the "Missouri Dental Journal" for Nov. 1872, from the pen of Dr. R. Blacke, Laureate of the Medical School of Paris, seems to hold out promise of beneficial results from the use of the recent preparation of the syrup of the lacto-phosphate of lime. The article seems encouraging to us who seek for aid in this direction. The reasoning of the author certainly appears convincing, and his argument does not rest upon theory alone, but is based upon experiments which seem fully to warrant what he claims for the remedy. It is very possible that in this remedy we may find one of the agents which we seek, as a means for the prevention of dental disease. It is certainly worth our while to give it a thorough trial, for without empirical knowledge of its operation, we can form no correct judgment upon its merits. Meanwhile, our attention should be earnestly directed toward the investigation of the various abnormal conditions which unquestionably influence, in some way or other, the progress of dental caries, and our endeavor should certainly be to arrive at a knowledge of such remedies as will cure, or at least ameliorate those conditions.

In what I have said of constitutional treatment, I am aware that I have advanced little that is of any value, except in so far

as my remarks may help to stimulate thought and action in this direction, on the part of many men in the profession who are qualified to prosecute such investigations and experiments as shall eventually bring us the desired aid.

It is with the hope that such may be their effect, that I leave the consideration of this point, and turn to consider what other means, if any, there are that are available as in any sense preventive.

It has been established as a fact, from long-continued observation, that the teeth are especially liable to decay, in a large majority of cases, upon their proximal surfaces, where those surfaces are in contact. It has also been observed, that where there exists a free and ample space between the teeth, those surfaces are as a rule exempt from caries. These are established facts, not mere theories. These conditions are observed in mouths of every variety of character, and with teeth of corresponding variety. Where the secretions are vitiated and unduly acid, and as well where they are apparently normal and neutral. So fully recognized are these facts at the present time, that it is doubtful if any person could be found to-day who would deny the proposition, that if free spaces naturally existed between the teeth, there would be comparatively little danger of caries attacking those surfaces.

These facts would justify, as entirely reasonable, the proposition that if such spaces could be artificially secured, without injury to the teeth by reason of the operations necessary to that end, then we might feel confident that we had secured a method of prevention which would greatly lessen the sum of human misery, and add largely to the beneficent influences of our calling. In view of the fact that it is more difficult to arrest decay upon the surfaces now under consideration, by the process of filling, than when it occurs in any other locality, and in view of the fact, too, that the majority of teeth which are eventually lost under the hands of skillful practitioners are lost in consequence of decay upon these surfaces, it becomes us most earnestly to inquire if any such method of separation for prevention may be safely pursued,

and what grounds there may be to support the hope that such a practice would prove successful.

To secure such permanent artificial spaces, resort must be had to the cutting away of the teeth, by the use of the file or other instruments. The use of the file for this purpose is of old date in the history of the profession, though its application in times past was confined chiefly to the incisor teeth. All the text-books refer to the practice (more generally, however, for the removal of superficial decay, than as a means of prevention,) and none of these entirely condemn it.

Undoubtedly the use of the file, or its equivalent, has been more or less resorted to for the purpose of prevention of decay, by means of creating spaces between the teeth, from the commencement of our life as a profession to the present day; but it has never been systematically recommended until quite recently, when Dr. Robert Arthur, of Baltimore, promulgated to the profession and the world, his "*system* for the prevention and treatment of decay upon the proximal surfaces of the teeth." His method contemplates the general separation of the teeth, by means of cutting away their approximating sides.

In determining the merits of his claims, it is necessary first to satisfy ourselves whether the teeth may be cut away, as he proposes, with safety, or without injury. There was, for a long time, a very general prejudice against the removal of the enamel of the tooth, because it was thought that the dentine, thereby exposed, would more readily decay—in fact, that it would be quite certain to do so in many cases, simply by reason of the removal of the enamel. Such a prejudice still exists to some extent, though probably to a very limited degree, compared with a period a few years previous to this.

The fact would seem to be now established, by reason of observations covering a period of many years, that a properly polished surface of dentine, especially when not in contact with any other surface, will not perceptibly be attacked by caries sooner than a surface of enamel under similar conditions. This I assume to be true. Granting this, we must acknowledge that there can be no

objection to the cutting or filing the teeth for the reason of supposed injury thereby resulting. Having then satisfied ourselves that there is no just ground of opposition to the *means* which Dr. Arthur proposes to employ, let us further examine *how* he proposes to apply them, and what he expects to accomplish thereby.

Briefly stated, his expectation from this treatment may be summed up thus, quoting mainly his own language: "Decay of the teeth may be *prevented* from occurring at places where it is most destructive, and requires the most difficult, painful and expensive operations for its arrest"—*i. e.*, the proximal surfaces. This is the chief claim, and the one mainly interesting us at this time. I cannot suppose that any well-grounded opposition to this expectation can be sustained, provided ample, *permanent* spaces can be secured. It has been already affirmed that ample spaces of a *permanent* character between the teeth, of natural occurrence, would undoubtedly, as a general rule, prevent the occurrence of caries on the surfaces now under consideration. This is again reaffirmed as being a proposition, in view of what experience teaches, of a self-evident character.

His method of *application* of these means requires a somewhat more extended and careful consideration. Let us commence with him, at the very first step. He proposes, upon the appearance of the first permanent molars, to cut away the temporary molars, which would then be in contact with them, creating so ample space as to insure the mesial surfaces of the first permanent molars from decay, certainly up to the time of the eruption of the second bicuspids.

There can be no objection urged against this treatment, certainly. But I cannot do better than to quote Dr. Arthur's own language upon this point. He says: "If decay should never attack the permanent molar teeth at the points referred to, even if the separations were not made, the cutting away of these temporary teeth cannot be in any way injurious, as the enamel of the permanent teeth is left intact. * * * But, as almost universally happens, and as has been shown, the permanent molar teeth do decay frequently and rapidly at the points referred to, the

service advised must be admitted to be invaluable, if they are protected from an attack of decay."

This seems to me so entirely reasonable that I conceive it to be only necessary to secure your thought upon this point for a moment, to gain your approval of his system thus far.

The next step in his method is to treat the temporary laterals, when they are in contact with the permanent centrals, as the temporary molars were treated—*i. e.*, to cut them away freely, thereby securing safety to the distal surfaces of the permanent centrals, until the permanent laterals take their place in the arch. This can have no objection urged against it, any more than in the case of the temporary molars. The next step takes us to the mesial surfaces of the permanent central incisors, which are in contact, and which he proposes to treat in the same manner, so cutting them away on their lingual aspects as not to disfigure their appearance in the slightest degree, and yet to leave them in contact at the least possible point; while the proximal surfaces shall be, to a great extent, self-cleansing, and always easy of examination. To this practice, if the premises which, it is claimed, have heretofore been established, are correct, there can certainly be no well-grounded objection.

I think it can be safely affirmed—and I do not anticipate that a denial will be offered by any in the profession throughout the land—that such spaces, so secured, and the cut surfaces properly polished and re-polished as often as may become necessary, will render these teeth almost absolutely secure from decay upon their proximal sides. The treatment follows on with the eruption of the permanent teeth, and repeats itself with the six anterior teeth; and no objections can be urged against these subsequent operations that could not have been urged against the very first operations upon the permanent incisors.

We now come to the treatment of the bicuspids and molars, which he proposes to treat upon the same principle. The only point claiming our particular attention with regard to these teeth is the shape which he gives to the spaces. It is designated as the double V, or double wedge-shaped—that is, as though two wedges

had been cut from between the teeth, the base or broad end of one of which should lie toward the palatine or lingual aspect, and the broad end of the other wedge at the grinding surfaces of the teeth. The spaces are shaped thus for the purpose of securing self-cleansing surfaces—or, in other words, so that the food which, in mastication, must necessarily be forced into these spaces, will still be inclined to be easily forced out of them, and so rather be pushed over the surfaces, and not be permanently lodged and retained, and also so that the secretions of the mouth, and more comminuted particles of food remaining after eating, may, by the action of the tongue and the flowing of the saliva, be easily removed, and consequently less of such material be retained to become destructive through the processes of decomposition constantly going on in the mouth. That this peculiar shape given to these spaces is the best that has yet been devised, I think there can be no doubt. It seems to be entirely in accordance with well-known principles of philosophy, and until some other method of shaping such spaces shall be demonstrated to be better, these must remain as unquestionably the correct shapes, when it is decided to separate the teeth at all. Here I must quote from Dr. Arthur, who says, in speaking of the points essential to success: "The separations must be thorough. No obstructions to the free passage of a piece of thread, or linen, or the tooth-pick, must be permitted to remain. The spaces must be made free *from the grinding surfaces to the gums.* * * * * The teeth may be permitted to touch at some point, but the contact must be so slight as readily to allow the passage at pleasure of the substances employed to cleanse them. The surfaces of the separated teeth must, if possible, be rendered plain. *It is essential that they should be thoroughly polished.*"

I will here quote again from the same author, from different parts of his book. On page 103 he says: "Now let it be clearly understood that this separation of the incisor teeth is *not advised* indiscriminately. The incisor teeth of every child do not necessarily or inevitably decay. There is a small, but it is a very small, number of individuals, who, even at the present day, when

the prevalence of decay is so common, pass through life without being subject to decay of the teeth at all; and sometimes, though more rarely, the incisor teeth remain sound during life, while the back teeth are destroyed by decay, commencing on the surfaces in contact. A dentist who is worthy of the name should be able to recognize such cases, and to avoid unnecessary and injurious intermeddling with any of the teeth."

On page 154 he says again: "It will be seen that I do not advise the indiscriminate and almost unlimited filing of the teeth, as has been supposed." And on page 169 he sums up thus: "What I propose is, *the separation of teeth closely in contact*, which are of such frail character, and are exposed to such destructive influences, that their decay is inevitable, or has already occurred."

I have now briefly and imperfectly presented the main features of Dr. Arthur's method, and have endeavored to fairly consider the chief and obvious objections to the proposed operations, as they have been followed in their order. It now remains for us to consider what objections can be urged against the system as a whole, and to discover what lessons experience teaches, by which we may form some reasonable conclusions, regarding the hopes which may be entertained concerning such practice.

Among those in the profession who fully agree with Dr. Arthur's method, as applied to the incisor teeth, there are some to be found who make the objection (inquiringly), as regards the application of the method to the bicuspids and molars, that the spaces he proposes to make will not remain permanently, but will sooner or later become closed, or so nearly so as to defeat the ends for which they were made. Others again dogmatically assert that they will so close, and no good can result of a permanent character from this treatment of the bicuspids and molars. Now let us consider for a moment what would *seem* to be the probabilities in the case. There can be no chance for an argument respecting the spaces broader at the grinding surfaces than at the necks of the teeth, for they cannot be closed up except in defiance of all laws of mechanical force. As touching the V

spaces having their broadest opening at the lingual or palatine aspect, it would be impossible to suppose, even if the disposition of the teeth was to turn on their longitudinal or perpendicular axes, that they would do so sufficiently to materially lessen the spaces between all the teeth, for in that event the teeth would eventually be contracted into the shape of a circle, and that of very small diameter. It is possible that certain individual teeth, or pairs of teeth—as, for instance, the bicuspids—might, and sometimes would, incline toward one another, and by rotation lessen, or absolutely close up, the spaces between them; but, in that event, the spaces between each of these teeth and its mesial and distal neighbor would be increased. It is difficult to think it possible for such spaces as Dr. Arthur proposes to make between the molars and bicuspids, ever to become materially lessened by the change in position of the teeth; and I think we must dismiss this ground of objection to the practice, as not being sustained by reason or philosophy.

Another objection suggests itself to many who are mainly in favor of the general plan, and that is, that although the spaces may be ample at the broadest end of the two wedges, yet that the narrowing to a point must be so gradual that they fear the place for the lodgment of decomposing food, or other deleterious agents, would rather be increased than diminished by this proposed separation. It is certainly true that the spaces must be very small, as the sides of the separation approach one another, and though perhaps the teeth are actually touching at only a single point, they still are in so close proximity, unless separated to an extent which I do not understand Dr. Arthur to advocate, as to *seem* in contact for a considerable extent of their surfaces. This would appear to be a possible objection, but experience may teach us that it is unsound. It clearly can have little weight, if the proper care is observed on the part of the patient with regard to cleansing the teeth; nor can I conceive that it should influence us at all, unless we are convinced that the teeth are more exposed to decay than they would be if not separated. And again, I think it would need to be shown that the teeth would decay

much more readily when thus separated, in order to counterbalance the benefits which would be derived, of easier access to the surfaces, for the purposes of examination and cleansing.

Another objection, very strongly urged by many, is the great annoyance to the patient, and injury to the gums, from the crowding of food between the teeth, and its pressure upon the soft parts, which would probably result from this treatment. This objection can only be met by the teachings of experience. We need waste no time in argument upon a point which can only be determined by the actual demonstrations of long and various experiments; but it may not be amiss to say that it is very possible that those who urge this objection so strongly do so without fully and clearly understanding the character of the separations proposed, and may have in their minds the complaints they have heard from their patients where the separations were of a very different character.

Again, objection is made to the cutting away of so great an extent of masticating surface. I apprehend this objection can not stand for a moment, if it is once conceded that Dr. Arthur's method will accomplish what he claims for it.

In fact, let this once become established, and all objections melt before the inexorable logic of demonstrated success.

It now remains for us to examine what experience teaches regarding this method, and to inquire if that teaching and the promptings of reason indicate the propriety or otherwise of our pursuing this method.

In the line of the testimony of experience, we have that of Dr. Arthur himself, whose testimony is by far the most important of any others, because his experience extends over a much longer period of time. It may be urged by some that his evidence is not to be too implicitly trusted, because he is an interested party, and that he would naturally think that methods of his own devising were better than all others. This might, or might not, have weight with those who are acquainted with Dr. Arthur; but to those who do not know him, there are some points worthy of consideration in estimating the value of his evidence. He

certainly presents a most striking peculiarity in contrast with the large majority of those in our profession who have, or have claimed to have, devised new methods of practice. While most of these have rushed before the profession with their new-born ideas barely crystallized into intelligible form and expression, and have announced their new methods to be pre-eminent over all others, and sure to stand, though unsupported by the test of any experience worthy of the name, he comes to us after, as he tells us, a careful practice of the method for a period of twenty-five years. He presents us this method as the result of very mature and careful thought and study, indorsed by his long experience of its success. He tells us that he did not rush into this practice in a headlong manner, but carefully following the indications of his convictions, step by step feeling his way, he was brought to the conclusions which have resulted in his "method for the prevention and treatment of decay of the teeth." To me, and I think to most fair-minded individuals, the testimony of such a man, as to even his own methods, challenges attention and credence in no ordinary degree. His evidence is to the unqualified success of his treatment. We cannot ignore his testimony; it must have *great* weight, even if we are convinced that it should be received with some degree of caution. We have no other testimony covering the same ground, but perhaps some may be found tending to corroborate his, among those who have not pretended to follow his method as such. It has probably been the fortune of most of the older practitioners to have witnessed, more or less frequently, the operations of a class of prominent practitioners who, from fifteen to twenty years ago, were in the habit of separating the bicuspid and molar teeth, for the purposes of filling, to the extent, sometimes, of sacrificing one-half or two-thirds of their grinding surfaces. I think it cannot have escaped the observation of those who have seen many of this class of operations, that as compared with those equally well performed by others, or even by the same individuals, where the separations had been slight, or only temporary, or without the broad V shape, the first mentioned operations were, after the lapse of years, standing evidence

not only of the skill of the operator, but of the value of the space, as tending to the preservation of the teeth; while those of the other class, even if of much more recent date, would more frequently present the evidence of the necessity for their renewal, even if the teeth were not already so extensively destroyed as almost to preclude the possibility of saving them. I do not refer to isolated cases now, but to observations covering a large number, and where the opportunities for comparison have existed. It has been my fortune to have the opportunity to see a large number of operations, in a large number of mouths, made by the same individual, one of the first operators in the country. These operations have been of various dates, covering a period of eighteen years. The earlier of them were almost or entirely made with the very broad V shape referred to. Some of the later ones were of the other class, such as are denominated contour, or nearly so. The difference has been *very* marked, so much so as to challenge my very particular attention. Others have made the same observations regarding this same gentleman's operations, in other cases which have fallen under their observation, and not under mine. This would seem to furnish a very strong case in favor of the method of using the free opening—much stronger, of course, by reason of noticing the comparative results of the different classes of operations from the same hand, and that the hand of a master, than though the different classes were compared as performed each by a different operator.

Still, the comparison of the results of such different classes of operations, made each by different individuals, must furnish us, if uniform in result, and covering a long period of time, incontestible evidence of the superiority of one or the other method. My own observation, and I doubt not that of most of you, has confirmed the opinion that the broad V-shaped spaces are exceedingly valuable, as securing the greater permanence of operations and preventing further decay on the proximal surfaces of the molars and bicuspids. The separations to which I now refer, the results of which, having particularly attracted my notice, have been *very*

great, as was mentioned, sometimes to the extent of cutting away one-half or more of the grinding surface of bicuspids, and even the same of molars. Now I do not understand Dr. Arthur to propose any such extensive separations, though his work is rather indefinite in its information respecting the width of the spaces. It, therefore, remains to be proven by demonstration whether the smaller spaces with the double V shape will prove as valuable as it seems to be established the larger single V shape is, for the purposes under consideration. If we accept the testimony of Dr. Arthur, and give due weight to such other corroborative testimony as observation and experience furnish regarding the effect of spaces between the teeth, I am constrained to think that there can be very little urged against his method that will bear the unprejudiced criticism of reason and philosophy. It is to be regretted that his book was not addressed more exclusively to the profession, and that it does not enter more fully into details of processes—as, for instance, as to the breadth of space which should be secured in separating; and in many other particulars it might have been more explicit and more instructive. I had hoped to secure from him a few models to present to you, practically demonstrating the shapes and other characteristics of the spaces which he advocates; but he could not furnish them to me, and so we must exercise our own judgment in the matter, and get at an understanding of his method to the best of our ability, unaided by such guides.

Now in view of what has been thus far advanced, may we not hope that a better way is opening before us?

I am not prepared to say that there can be no better way, or to dogmatically assert that such practice as Dr. Arthur proposes will be successful beyond the peradventure of a doubt, but I do think that I may safely ask your most thoughtful and unprejudiced consideration of this method, believing that it does at least lead in the right direction.

There is one point more only, in Dr. Arthur's book, to which I wish to allude, but it seems to me of so much importance as not to justify my passing it by. Page 154, he says:—"I have said

that this method of treatment is simple; it is so. All the requisite operations are certainly within the capacity of dentists of very moderate ability."

Here I should take issue with him most decidedly. His language here seems to imply that very little skill is requisite for such operations, an inference which would be likely to lead to most disastrous results, and work serious injury by reason of hurried, slipshod, or insufficient operations of this character. In fact his own language immediately following the above quotation, seems to contradict this inevitable inference, for he says:—"But in order to be effective, this treatment demands the exercise of the nicest care, patient labor, and subsequent watchfulness of the most rigid character. No slovenly or hurried attention will suffice. All successful treatment of the teeth indeed, no matter what plan may be pursued, requires this exercise of care and attention in a much greater degree than is common."

Now my own experience has been that these operations are by no means so easy of execution as his remarks generally throughout the book, would lead one to suppose. On the contrary, I believe that for their most successful accomplishment they require a very high degree of skill. In fact, I have come to think that even the filling of so-called simplest cavities in the teeth, cannot be performed properly without more than a low order of capacity. I think Dr. Arthur has made the mistake that men are apt to make, when writing of practices and methods of which they are master, that is of seeming to underrate the importance of the operation, or the extent of their own ability.

Things that are easy of accomplishment to such men may be very difficult to compass for the majority, and one is apt to think and speak of things which are so familiar to himself, as though they would of necessity be just as apparent, or easy of accomplishment to all.

Such an error should be carefully guarded against, and no one should imagine for a moment that the teeth can be successfully treated, without a more than ordinary degree of skill, or by the employment of any but their best and highest endeavors.

We have now considered as fully as such a paper as this admits, the only proposed plan offered as yet, as superior to old methods for the prevention of decay. The treatment of it, after it has occurred, need not occupy our attention for more than a brief reference, as the only peculiar feature which would characterize it, under the method which has been discussed, would be that of the separation to be made, practically the same as those for the prevention.

Of course, after decay has progressed beyond a certain point, its removal by cutting becomes impracticable, and it then only remains for us to fill thoroughly upon the surfaces presenting after the separations are made, in accordance with the foregoing method. I cannot close this already too lengthy paper, without saying that the thanks of the profession are certainly due to Dr. Arthur for thus placing before them a method thoroughly systematized (for whether perfect or not, it cannot be all wrong,) as it is the first method having this characteristic, ever presented to us. It is possible that the time will come when we shall acknowledge our gratitude to him for having directed us in a better way, and when our patients, too, will bear his name in grateful remembrance. I think it probable that time will come. Finally, let me urge you again, carefully to examine and test this method, and not to condemn it by reason of strongly fixed prejudices in favor of other and probably more popular ones. Let its merits alone influence your decision, and if, after an impartial trial, it fails in your judgment to bring the desired results, rest not in your endeavors to attain to a better practice than any now known to us.

In such pursuit alone can we fill the proper measure of our responsibility.

DISCUSSION.

Dr. Crouse, Chicago—It is very unfortunate for an able paper to be read at the close of the session. He should advise members

to get Arthur's book, and study it, although there was a little appearance of quackery and "gilt edge" about the work, yet, being partially addressed to the public, it might save us a great deal of trouble if our patients would read it.

Separating teeth is a matter of great importance. The first thing to determine is how to effect the separation. In order to be of benefit, it must be permanent. It is not necessary always to make these separations V-shaped, and sometimes, with bicuspids, as in certain cases of irregularity, it is better to have the base of the triangle on the outside, because the pick can be best used if teeth are left in that manner. In the lower teeth, particularly, he should generally have the widest space on the outside, as the saliva from the ducts under the tongue is in great abundance on the inside, and, hence, can wash out such spaces better, aside from this, it is almost impossible to remove food from between the lower teeth with a pick, if such spaces are made largest from the inside. Arthur does not describe his process minutely enough.

In irregular teeth, the speaker should, in the majority of cases, leave a shoulder, and not make a V-shaped separation.

In front upper teeth, separations may often be made from the palatal side, with cone-shaped burrs, so as to leave the front edges in contact, and thus retain the natural appearance of the teeth.

The proper time for these separations is just as soon as decay commences; parents must be taught that these operations are essential to prevent the necessity of filling within a short time. In the molars and bicuspids there is an objection to these openings, on account of the food pressing in, and being inconvenient in mastication.

The prejudice against these operations must first be removed from the profession, as we are responsible for its existence among the people.

Dr. Miner, Davenport, Iowa—It used to be advocated long years ago that superficial decay should be filed away. In the mouth of a prominent gentleman in the profession, teeth that had

been treated in this manner thirty years ago, have not since decayed.

Dr. CHASE, St. Louis, was pleased with the amount of vital action acknowledged in the paper. Arthur's plan is, not only to operate upon teeth which already are decayed, but also on those which are perfectly sound, to prevent its occurrence. Eight years ago, a lady now living in St. Louis, then a patient of Dr. Arthur's, had her teeth treated by him for prevention, they were at the time perfectly sound, teeth immediately became sensitive, operation was repeated two or three times afterwards, and teeth are to this day tender. The lady has a sister two years younger, whose teeth are perfectly sound; Dr. A. desired to operate upon them in same manner, but the lady being frightened by her sister's experience, declined. Now, to-day, these teeth, that have not been operated upon at all, are perfectly sound.

This is a case of positive injury. Merely states this case to put people on their guard. Where decay has already commenced, the operation is allowable. Is willing to be put on record as against the theory as advocated in that book.

The central incisors on the palatal side can be cut away with good advantage, and without the danger, as in bicuspids and molars, but this has been generally practiced a long while. Dr. Arthur's method requires constant attention after the operations; if just as much care is given the teeth under other circumstances, decay would be just as much prevented.

Where there is great pressure of the teeth, the speaker advocates extraction of the second bicuspid, as in children thirteen or fourteen years old, has practiced this, and knows the first molar will move bodily forward, and not tilt, and also the first bicuspid will move backward. It will also increase the room for the wisdom teeth.

Dr. MARSH, Chicago—Is not converted to Dr. Arthur's method, recommends the use of floss silk to keep teeth clean. In crowded arches expands by spreading bicuspids, fills carious cavities with gold.

Dr. KULP, Davenport, Ia—Is now treating a patient who had his teeth filed apart for the purpose of preventing decay. Three or four years ago he had all the proximal surfaces filled with amalgam in the East, which amalgam fillings have since been replaced with gold.

On one side a tooth had been lost, and no filing had been done, there was no decay on that side. He concludes that the cutting away is not safe practice in all cases. It is unsafe in weak constitutions, and between bicuspids and molars.

Dr. HARLAN, Chicago—Teeth should be separated at an early age, and the separations polished frequently afterwards, for at least three years ; thoroughness in polishing is necessary, a coarse file or corundum is not sufficient, and square shoulders must not be left, as it is not possible to keep such surfaces clean. The discerning dentist must determine where, and where not, to operate in this manner.

Dr. LOW, Chicago—The more he reads Arthur's work the less he agrees with him. Changing the shape of teeth injures the design of mastication. Cleanliness is essential, without cutting away the material of the tooth.

Dr. BLACK, Jacksonville, Ill—Was at first almost disgusted with the book, but after studying closely the controlling idea contained in it (prevention of decay on proximal surfaces) has modified his views. We may do harm in some improper cases, but a great deal of good in proper ones. Decay occurs at points where there is a statical condition of the fluids, if a separation be effected at these points so as to secure free and continuous motion of the fluids, it will be beneficial. In changing the shape, square shoulders must not be left, especially at the gingival border, for the gum to lap over and become irritated, and give out acid secretions. There is an age when all decay ceases; never had decay commence in his own mouth after he was seventeen years old. The fluids of the mouth are in such condition that the teeth could not decay, vital action or no vital action, the phosphate of lime does not dissolve.

Dr. CUSHING—The cases cited by Dr. Chase and Dr. Kulp do not prove anything against the principle advocated by Dr. Arthur. If the statements of these cases are true in every particular, they would not prove anything against the principle, but only want of judgment in its application by him in these particular instances. He may possibly be a poor hand to carry out his own theory, yet this would not be any argument against the truth of the theory. We are too apt to bring with us prejudice in the consideration of new methods, and examine with a disposition not to find them successful. Does not wish to rest on the testimony of individual cases; does not claim that the entire truth of the theory is established; but does think it worthy of investigation.

We have especial reason to believe Dr. Arthur, as this is not a newly conceived idea with him, but the result of a life-long practice and study.

Dr. CROUSE—Prof. Chase's case is no proof, as one sister is no criterion by which to judge of another, aside from the fact that patients' statements of cases are not always reliable; such testimony is altogether too circumstantial to be considered of weight.

In the case cited by Dr. Kulp, the probability is that decay, had already commenced before the operation of separation was performed; we have all seen cases where decay occurred on one side of the mouth, and not on the other, and therefore it would hardly do to judge from this case as to the value of separations for prevention of decay.

UNUSUAL CASES IN PRACTICE.

A. J. WAIDE, NEWTON, IA.

CASE 1.—About 1862 Mr. O. B., aged sixteen years; tumor of the size of a hickory nut beneath the lower maxilla, anterior to the angle. The tumor was easily moved to and fro, but after a while it became so very large as to swell that side of the face badly.

A physician had treated it with iodine, externally, a few days, then lanced it, after which the swelling subsided to about the size of a hickory nut; then, after a few months, it increased again. It continued to do so for two years, until the wisdom tooth was erupted, which cured it entirely. The treatment should have been to remove the second molar, but that was sound, and I did not recommend it very strongly, because he being so young I did not quite believe the third molar was ready to be erupted, and it did not seem to be when I first examined the case. He had two physicians to treat it, and they did not know the cause of the tumor.

CASE 2.—Mr. S., aged about forty-five. He stated that he had lost his six front upper milk teeth when about eight years old, but I presume he was eleven by the time he lost the cuspids. About seven years ago he lost two more milk teeth where the first bicuspids should now be. He said he had never had any of the permanent teeth in place of those eight front milk teeth.

About eight months ago he had a plate made with eight front teeth on it; after wearing this three or four months he found the mouth getting sore under the plate; he thought the poor fit of

the plate the cause of the soreness. At this time he called on me, and I discovered a hole through the gum, and the point of the right cuspid projecting about one-fourth of an inch posterior to where the right central incisor should have been. As soon as it came down so that I could extract it, I did so.

In six months and twenty-three days afterwards, ether was exhibited, and the left cuspid extracted, a little to the left of where I had extracted the right one. After his mouth had healed up I made him a new plate, and did not hear of his erupting any more teeth.

Case 3.—Mr. Hill, aged fifty-seven. First right superior bicuspid decayed on the neck of the tooth, on buccal side. Cavity rather small. Patient felt neuralgic pain through his head whenever he would eat. The pain commenced in the tooth, then extended up through his head, and continued most of the daytime. I do not now think the pulp of the tooth was exposed, but thought it was at first. I destroyed the pulp; patient was much relieved in an hour or two; afterwards filled. In a few days found there was pain in the right superior cuspid whenever the patient would eat sweets. There was a small superficial cavity on neck of said tooth, on the anterior proximal side. Put a drop of molasses on it, and it caused intense pain; removed decay and filled cavity.

Two weeks later (Jan. 16, 1869) patient called again; complained that when eating molasses he had great pain from the last tooth I filled for half an hour, after which there seemed to be a great feeling of fullness in the head, as though it was expanded; also that cold water applied to his face in washing, or a cool towel in wiping, would cause neuralgia. Found a slight superficial cavity on buccal side at margin of gum; treated with lunar caustic.

Two days later patient called, as I had requested; reported no pain while washing since I applied the caustic. Applied some more, this time to make sure of a cure, and requested him to keep it clean from food, so that it would not decay any more. Years following heard no more trouble from it.

CASE 4.—June 2, 1871. Patient Mrs. T., aged thirty-five. Troubled with an epulo-encysted tumor, located on the lingual surface of the right side of the lower maxilla, extending from the posterior side of the first bicuspid to the anterior side of the third molar or wisdom tooth. The second molar and second bicuspid were missing; the first molar was very much decayed, also very loose, and pulp dead; crowns of the three teeth all covered with salivary calculus, extending two-thirds down the roots; color of calculus, yellow next to the teeth, greenish on the surface; size of tumor—length, seven-eighths of an inch; width, three-fourths of an inch; depth, seven-sixteenths of an inch, with a thin attachment to the gum about one-half of an inch in width. Tumor felt hard and firm; surface looked healthy, except on the side next to the decayed first molar, which was inflamed and of a deep red color. The edges of the gum about the three teeth were much inflamed; there was continual pain in jaw, with loss of sleep and loss of appetite. Treatment—removed the three teeth; pain nearly ceased in a short time after.

I wished then to remove the tumor, but patient refused to have it done that day, saying that she was so weak that she had rather wait a few days. I then applied iodine to the tumor, and requested her to call the next week and have it removed; but her physician, who was present, said to her that perhaps it would slough off and not have to be excised. I thereby lost the chance of preserving it in alcohol, for after a few months I heard it had sloughed off, and that the patient was entirely well.

ERRATUM.

In place of May 30, the date over "Minutes of Joint Session," read May 13.

TABLE OF CONTENTS.

MINUTES—ILLINOIS SOCIETY.

PAGE
Officers ..... Fly Leaf
Roll Call 5
Report of Committee on Rubber Question 6
Report of Committee on Legislation... 6
Report of Committee on Infraction of the Code 7
Report of Committee on Publication.... 7
Report of Treasurer 9
Report of Secretary 10
Report of Executive Committee..11, 17, 20
Vote of thanks to Publication Committee 9
Vote of thanks to Iowa Society 20
Vote of thanks to "Harper House"..... 20
Election of Members 11, 17, 19
Free Ferry across the River..... 12
PAGE
Amendments adopted 16
Amendments proposed.. 16
Dr. Greenleaf's Case.... 19
Election of Officers and Next Place of Meeting 19
Resolution in regard to the Preferring of Charges 19
Order on Treasurer in favor of Secretary 20
Induction of New President 20
Honorary Member elected..... 20
Delegates to American Dental Association 20
President Smith to deliver next Annual Address 20
Publication Committee appointed..... 21
Adjournment.. 11

MINUTES—JOINT SESSION.

Programme for Joint Session adopted.. 29
Committee on Volunteer Essays..... 30
Report of Same..... 31
Clinical Operators for Illinois Society.. 30
" " " Iowa " .. 30
Non-members Invited to the Floor..... 31
Clinic omitted, and Meeting for Special Business..... 32
Resolution regarding Dental Colleges.. 33
Publication of certain matter left discretionary, &c..... 34
Vote of thanks to Ferry Company 34
Adjournment..... 34

ADDRESSES.

Annual Address—President Cronse 12
Mayor Murphy's Address 25
President Ingersoll's Response..... 26
Dr. O. Willson's Response..... 27

ESSAYS.

"Abrasion and Erosion," C. R. E. Koch 37
"Chemistry of the Oral Secretions, &c.," E. C. Chase 56
"Removal of Pulps, &c.," G. O Howard 65
"May the Calcific Elements of the Deciduous Teeth be Appropriated, &c.," M. S. Dean..... 79
"Anatomy and Histology, &c.," I. P. Wilson 89
"Contour Fillings," K. B. Davis..... 98
"The Part Which Vital Action Plays, &c.," H. S. Chase 107
"Pivot Teeth," E. D. Swain 118
"Diseased Conditions, &c.," G. V. Black..... 129
"Care of Children's Teeth, &c.," P. E. White 145
"Mechanical Dentistry," W. O. Kulp 154
"The Elevation of the Dental Profession," C. Stoddard Smith..... 160
"Prevention and Treatment of Caries on the Proximal Surfaces," G. H. Cushing 170
"Unusual Cases in Practice," A. J Waide..... 192

DISCUSSIONS.

"ABRASION AND EROSION."

Remarks by Dr. Chase, St. Louis..... 62
" " Dr. Koch..... 63
" " Dr. Black..... 63

"REMOVAL OF PULPS, &c."

Remarks by Dr. Glidden.....69, 71
" " " Black..... 69
" " " O. Willson..... 70
" " " Dean, Chicago..... 70
" " " Howard..... 72
" " " Goble..... 72
" " " Ingersoll.....72, 77
" " " Richey..... 72
" " " DeCrow..... 72
" " " Kulp..... 73
" " " Shattuck..... 73
" " " Smith (Iowa)..... 73
" " " Bell..... 73
" " " Wilson (Iowa)..... 74
" " " Porter.....74, 76
" " " Crouse..... 74
" " " Waide..... 76
" " " Chase (St. Louis)..... 76
" " " Kilbourne..... 78

"MAY THE CALCIFIC ELEMENTS &c."

Remarks by Dr. Black..... 86
" " " Judd..... 86
" " " Chase (St. Louis)..... 87
" " " Sanborn..... 87

"ANATOMY AND HISTOLOGY, &c."

Remarks by Dr. C. S. Smith..... 93
" " " Swain..... 93
" " " Judd.....91, 95, 96
" " " Peck.....94, 96
" " " Kulp..... 96
" " " Morrison..... 97

CONTOUR FILLINGS.

Remarks by Dr. DeCrow..... 101
" " " Willson..... 101
" " " Honsinger..... 102
" " " Kulp.....102, 104
" " " Black.....102, 104
" " " Kitchen..... 103
" " " Dyer..... 103
" " " Chase (St. Louis)..... 103
" " " Crouse..... 104
" " " Kilbourne..... 104
" " " Davis..... 105

"THE PART WHICH VITAL ACTION, &c."

Remarks by Dr. Smith (Ill)..... 110
" " " Dean.....111, 114
" " " Kilbourne..... 112
" " " Chase..... 112
" " " McGarvey..... 112
" " " Ingersoll..... 112
" " " Sanborn..... 113
" " " Low..... 113
" " " Chase..... 114
" " " Crouse..... 115
" " " Porter..... 116
" " " Smith..... 116
" " " White..... 117

"PIVOT TEETH."

Remarks by Dr. Kilbourne..... 127
" " " Harlan..... 128

"DISEASED CONDITIONS, &c."

Remarks by Dr. Kulp..... 143
" " " Judd..... 143
" " " Dean..... 144

"CARE OF CHILDREN'S TEETH, &c."

Remarks by Dr. Low..... 152

"MECHANICAL DENTISTRY."

Remarks by Dr. Crouse..... 156
" " " Judd..... 157
" " " Kulp..... 157
" " " Kitchen..... 157
" " " Honsinger..... 157
" " " Kingsley..... 158
" " " Black..... 158
" " " Ingersoll..... 158

"THE ELEVATION OF THE DENTAL PROFESSION."

Remarks by Dr. Davis..... 169
" " " Kulp..... 169

"PREVENTION AND TREATMENT OF DECAY, &c."

Remarks by Dr. Crouse.....188, 192
" " " Miner..... 189
" " " Chase..... 190
" " " Marsh..... 190
" " " Kulp..... 191
" " " Harlan..... 191
" " " Low..... 191
" " " Black..... 191
" " " Cushing..... 192

THE O. C. WHITE

Dental Operating Chair.

This is undoubtedly the best Dental Operating Chair now extant. Its framework and mechanism are wholly of metal, the elevating screw being of fine steel, working in a bearing of gun metal to insure durability and ease of operation.

The frame is grained in imitation of rosewood and upholstered in an elegant manner, some parts being enlivened with small portions of nickel plating, so that the whole chair, which is of graceful design, has a light and beautiful appearance. The mechanism provides for vertical elevation and depression of the whole body of the chair, or of simply the seat; also for rotary movement in a horizontal direction, and for tipping back and forward, besides all other desirable and requisite movements of the seat, head-rest and foot-rest, to adjust the parts to the requirements of all classes of patients.

It is manufactured under the personal supervision of the inventor, O. C. White, D.D.S., of Hopkinton, Mass.

PRICE, $150.00, Boxing and Freight extra.

For Sale by

H. D. JUSTI,

259 W. Madison St., Chicago.

516 Arch Street, Philadelphia.

ST. LOUIS

DENTAL DEPOT,

A. M. LESLIE & CO., Proprietors,

Dealers in Every Description of

INSTRUMENTS, APPARATUS, AND MATERIALS

Used by the Dental Profession.

ALL GOODS SOLD AT MANUFACTURERS' PRICES.

Manufacturers of the

VULCANIZABLE GUTTA PERCHA,

A perfect substitute for Rubber for Dental Plates.

Agents for the

ELLIOTT'S, MORRISON'S AND GREEN'S BURRING ENGINES,

Also for the

MORRISON DENTAL CHAIR,

Engravings of which will be sent on application.

Agents for

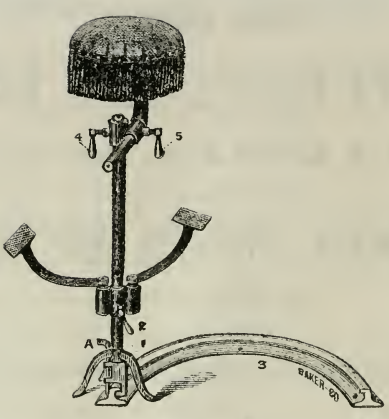
S. S. White's Porcelain Teeth, Pluggers, Scalers, Excavators,

ETC., ETC.

Orders Solicited.

Address, **A. M. LESLIE & CO.,**

319 North Fifth St., St. Louis.



Low's Adjustable Dental Stool.

The above cut represents a Dental Stool. It is adjustable, and can be used with any chair. The advantages claimed for this stool are as follows:

1st. That long and exhausting operations are made easy, the operator being able to perform three hours' extra labor each day, with less fatigue, thereby saving the strength used in holding up the weight of the body, and this mostly in a stooping posture, which so destroys the nervous system and the health of the dentist.

2d. This Stool is so arranged that it can be changed to any position the operator may desire, thereby avoiding all tiresome positions, being able to sit with ease and operate.

1 represents the connection of the stool with the rail (3), making it perfectly stationary, so that it can be used at any height desired, without tipping, using the foot rests when too high to reach the floor with the feet. These rests are strong enough to stand upon, and can be used for this purpose, in the extraction of lower teeth, in place of a footstool. By a slight turn of lever (A), the stool is disconnected from the rail, and can be reconnected with it at any other position as easily, or used without the rail as any other stool. By turning the lever (2), the foot-rests are raised or lowered. The rail (3) is 40 inches long, only an inch above the floor, and extends around the back of the chair. 4 is the lever by which the seat is raised, lowered, or turned on the shaft in any direction. 5 is the lever regulating the positions of the seat, which revolves with the body. The seat is upholstered with curled hair, and covered with green plush or brown leather as desired; the levers are silver plated; the castings are trimmed with gold leaf, making the stool ornamental as well as useful.

PRICE, $25, BOXING EXTRA.

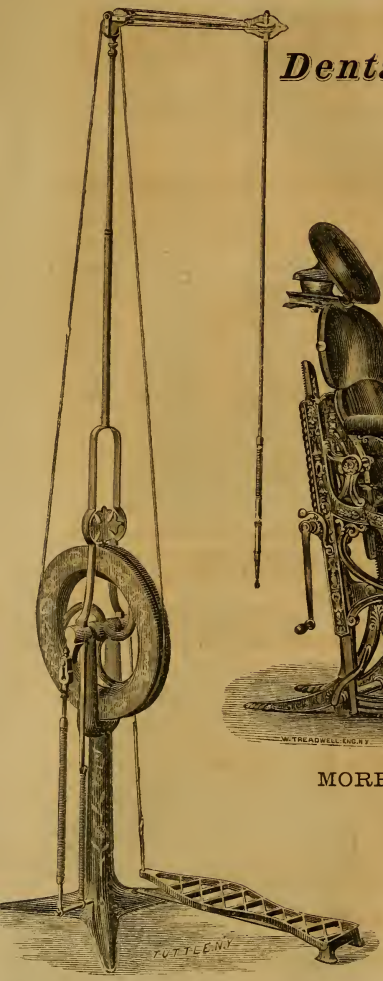
ADDRESS, DENTAL DEPOTS, or

J. E. LOW, Dentist, 229 WEST MADISON ST., CHICAGO.

JOHNSTON BROTHERS'

Dental Depot,

812 Broadway, N. Y.



MORRISON DENTAL ENGINE.
Price, $60.00. Right Angle Attachment, $5.00. Boxing, $2.00.

MORRISON DENTAL CHAIR.
Price, $150. Boxing, $5.00.

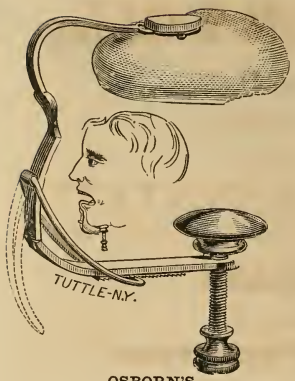
LIQUID NITROUS OXIDE.

CYLINDER CONTAINS 100 GALLONS.

SURGEONS' CASE,

Complete, $40.

BOXING, $1.00.



OSBORN'S

TONGUE HOLDER,

WITH THREE PORCELAIN CUPS,

Greatly increases the light in the mouth.

Price, $10.00.

INSTRUMENT STAND FOR ENGINE BURS

Price, $2.50.

THE

SOUTHWORTH OPERATING STOOL,

The *original* Operating Stool presents the following points for the consideration of the Dental Profession:

It can be used as an ordinary stool at any elevation between 20 and 34 inches.

It can be used with *one foot rest* at the back of the chair for the support of both feet.

It can be used with *one foot rest* at the right and *one* at the *back of the chair*, each having an independent movement.

The *foot rests* have a range of elevation of 17 inches, the lowest being 4 inches from the floor.

The seat is upholstered with green plush, and the foot rests with Brussels.

PRICE, with One Foot Rest,	**$20.00**
" " Two Foot Rests,	**22.00**
Boxing,	**1.00**

For Sale at Dental Depots.

W. VALLEAU, Jr.,

Manufacturer of

VIRGIN GOLD FOIL,

Warranted 1000 Fine.

ALSO,

PACK'S CRYSTAL PELLETS

AND

EUREKA GOLD FILLING.

---

506 BROOME STREET, NEW YORK.

Chicago Refining Company,

203 WEST MADISON ST.

BOYCE, THOMAS & SEWELL, Proprietors.

After twenty years' experience in the East, we have established ourselves in Chicago, and are manufacturing a very superior article of

GOLD FOIL,

Soft, Adhesive, and Semi-Adhesive,

Nos. 3, 4. 5, 6, 10, 20, 30, which we are selling at $30 per oz., $15 per ½ oz., $4 per ⅛ oz.

Since beginning business in Chicago, our success has been unprecedented for several reasons.

1st. We give our customers the benefit of Low Prices, by dealing with them directly, and not through depots, thereby *saving them from 15 to 20 per cent.*

2d. We give them Better Foil than can generally be bought, for the reason we *refine our own gold*, and employ none but the best and most experienced workmen.

In regard to quality of our foil, we respectfully refer to dentists of Chicago. Money can be sent by P. O. Order, as per heading.

Please favor us with a sample order, which will receive prompt attention.

H. D. JUSTI,

No. 516 ARCH ST., PHILADELPHIA,

AND

No. 259 West Madison St., Chicago,

Sole Manufacturer of

The Star Sections

And all kinds of

Artificial Teeth,

And Dealer in Gold Foils and every Description of

DENTAL GOODS AND FURNITURE.

The Manufacture of

DENTAL INSTRUMENTS

Now forms an important branch of my business.

Sole Agent for the

NEW GERMAN CEMENT,

Pronounced by those using it to be far superior to any Cement Filling now in the Market.

PRICE $3.00 PER BOX.

ESTABLISHED 1839.

JAS. H. ASHMEAD & SON,

MANUFACTURERS OF

GOLD FOIL, TIN FOIL & AMALGAM,

41 TRUMBULL STREET,

HARTFORD, CONN.

GOLD FOIL.

SAMUEL S. WHITE'S

ONE QUARTER OF A CENTURY

Dentists' Superior Gold Foil.

This FOIL has been known to the profession for about a quarter of a century. Under the names successively of Jones & White; Jones, White & McCurdy; Jones & White; and Samuel S. White, it has had a large and steadily-increasing sale. Many who adopted it when first introduced are still using it with satisfaction. As a result of an improved method of manufacture, the Foil supplied since January 1, 1872, has been very uniform, and superior in quality to that furnished at any pre vious period.

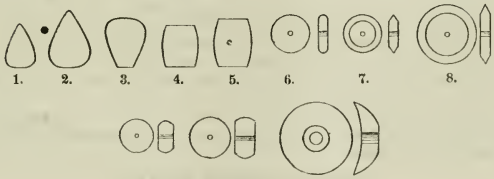
This is a SOFT FOIL when used without heating. It is made quite cohesive by heating, and must then be manipulated as cohesive foil is. Supplied in all numbers, from 4 to 240.

Price per ounce,	$36.00
" " ½ "	18 00
" " ⅛ "	4 75

FOR BURRING ENGINES.

CORUNDUM WHEELS, CONES, ETC.,

FROM FORMS FURNISHED BY DR. A. L. NORTHROP.



We are now prepared to furnish a variety of small wheels, cones, and other forms in Corundum, for dressing down fillings, preparing roots for pivoting, etc.

There are eleven forms, illustrated in the cuts, full size.

Price, 1 to 11 inclusive, 75 cents per doz., or 8 cents each.

Price, mounted on Mandrels, 1 to 11 inclusive, $1.50 per dozen, or 15 cents each

Polishing Wheels, Cones, etc., of the same forms, made of extremely fine material, are highly recommended. Same prices.

SAMUEL S. WHITE,

Philadelphia, New York, Boston, Chicago.

THE GLOBE GOLD FOIL.

UNDER this distinctive title (*name and design patented, March 25th*, 1873), attention is solicited to a GOLD FOIL which combines in an unusual degree properties regarded as very valuable.

Three distinct grades, *uniform* in their qualities, present, it is believed, all the variety desired in foil.

An unparalleled sale and an unprecedented unanimity in the recognition and hearty indorsement of this Foil show an appreciation by the profession of its quality, and of the essential differences in the various grades and their varying adaptability to different operations. The terms employed to designate the several varieties are intended to express marked distinctions in their physical properties, and consequently in their relative fitness for different purposes. The names are therefore *descriptive of differences*, and convey, when properly understood, the *distinctions* intended.

The term COHESIVE implies that different pieces of it will cohere or stick together by mere pressure, as if one mass. The term *adhesive*, hitherto used, rather indicates that it will adhere or stick to other things, not to itself.

THE NON-COHESIVE OR SOFT FOIL

is an exceedingly soft gold, which, when made up into masses, as blocks, cylinders, or pellets, yields readily under the instrument, without "balling," as it is termed.

THE EXTRA-COHESIVE FOIL

is a grade which, in the *stale* condition, may be worked cohesively in the form of pellets or ribbons; but, when heated in the flame of an alcohol lamp, it becomes exceedingly cohesive, and can then be used successfully only by those who fully understand how to take advantage of this property.

Attention is called to the unusual softness exhibited by this grade of gold under the *burnisher*, after having been packed cohesively. It is believed by those who have had the largest experience with it, to possess this important quality in a very marked degree.

THE SEMI-COHESIVE FOIL

is a grade between the soft or non-cohesive and the extra-cohesive. It will satisfy the wants of many who do not desire the greatest cohesiveness, and yet feel the need of more of this quality than can be developed by heating the soft foil.

With these three grades of gold, which are distinct and very uniform in their properties, each one will be provided with the means of meeting the various exigencies as they arise in practice.

We claim a uniformity of quality of each grade of this foil not hitherto attained, —a result of new and skillful processes, used only in the manufacture of the three grades offered under the name of

THE GLOBE FOIL.

☞ When ordering, state the *kind* of Foil desired.

For sale in all numbers, from 4 to 240.

Price, per ⅛ ounce	$4 75
" " ½ "	18 00
" " 1 "	36 00
" 2 ounces at one time, per once	35 00
" 3 " " " "	34 00

SAMUEL S. WHITE,

Philadelphia, New York, Boston and Chicago.

Extra Amalgam.

The attention of the Profession is again called to the Extra Amalgam. We have now had over three years' experience in the sale of this amalgam, and from the greatly increased demand for it, as well as from the various encomiums expressed to us both verbally and in writing, we are satisfied that our aim has been reached, viz., the production of an *amalgam* which, next to gold, will make the best filling now known. In the manufacture of the Extra Amalgam, the greatest care is taken that none but chemically pure metals enter into its composition. Gold, silver, platina and tin are used in its manufacture. We claim from actual experiment that it possesses the greatest possible freedom from shrinkage, that it keeps bright in the mouth, packs densely and works with great plasticity, and is impervious to the secretions of the mouth. The great proof of the value of the article is in the fact that those who order it once order again. Each lot is thoroughly tested before sale, and is sold with a guarantee that it possesses the qualities we claim for it. We have sold thousands of ounces during the last three years, and have yet to hear of a single complaint.

1 oz. packages,	.....	$4.00
½ oz. "	.....	2.00
¼ oz. "	.....	1.00

When money accompanies the order, the Amalgam will be sent postage free.

Liberal discount to the trade.

JOHNSON & LUND,

Manufacturers of Premium Artificial Teeth, Gold Foil, Rubber, Etc., and Dealers in all Articles appertaining to Dentistry,

620 RACE STREET, **PHILADELPHIA.**

68 ADAMS STREET, **CHICAGO, ILL.**

CATALOGUES SENT FREE ON APPLICATION.

An Improved Amalgam.

THE DENTIST'S AMALGAM,

COMPOUNDED BY DR. J. W. MOFFITT, HARRISBURG, PA.

The Amalgam is the result of careful experiments, and after testing it for many years we claim that :—It is prepared from chemically pure metals only : It contains no Cadmium or Bismuth : It will not darken the tooth: It requires less mercury in the process of amalgamation than any other: It will neither expand, contract or oxydise in the mouth: And above all, it possesses the most rare and valuable property of being removed as easily as a foil filling. This last named quality entitles it to take its place as the best of the Amalgams. It is not claimed that it is a substitute for gold, but that it possesses a larger combination of good qualities than any other amalgam in use.

Below are appended a few of the many testimonials we are constantly receiving:

A. HAVERSTICK, General Agent:

DEAR SIR:—For many years I have been opposed to the use of Amalgam, and at the time I received your sample of the Dentists' Amalgam, I had not had any amalgam of any kind in my office for several months. Your package laid in my case for weeks untouched, before having an application for an amalgam filling, and then at the urgent request of my patient, I concluded to try your sample of the Dentists' Amalgam. I have seen this case frequently since ; the filling remains bright, and without any visible discoloration to the remaining portion of the tooth. I consider it to be a very superior article of amalgam.

Very truly yours, T. G. TEMPLETON,

September 24th, 1872. Pittsburgh, Pa.

(Note—Dr. J. G. Templeton is Ex President of Pennsylvania State Dental Association.)

COLUMBUS, OHIO, February 7th, 1873.

This is to certify that in the month of October, 1871, I had two fillings placed in my mouth of the Dentist's Amalgam, and now to-day they are as bright, and free from shrinkage or tarnish, as when placed in the mouth [sixteen months ago], and have never caused me the least uneasiness or pain.

WILLIAM MITCHELL,
With Dr. J. B. Beauman, Columbus, Ohio.

I certify the above to be correct.—J. B. BEAUMAN, Columbus, Ohio.

A. HAVERSTICK, General Agent:

DEAR SIR :—About a year ago I received from you a sample of the Dentist's Amalgam, and at your request tried it in a tooth of a physician of this place. The tooth had formerly been filled with an amalgam filling, which was black with tarnish. I filled this tooth with the sample you sent me. This case I frequently see, and it is as bright as when placed in the mouth, now a year ago, and is free from shrinkage. I prefer it to any amalgam I have ever used.

Respectfully Yours, H. M. DUNMIRE,

January, 17th, 1873. Lewistown, Pa.

Price per Ounce, postage paid	$5 00
" " ½ " " "	2 50
" " ⅓ " " "	1 25

A. HAVERSTICK, General Agent,
620 Race Street, Pa.

For sale at Dental Depots.

A liberal discount to dealers.

STANDARD

SOFT,
MEDIUM,
COHESIVE,
CORRUGATED,
CRYSTAL SURFACE,
Pat. June 21st, 1870.

In Fineness, In Quality,

Gold Cylinders, (Pat.) Style A,
Gold Cylinders, (Pat.) Style B.

GOLD.

During the past year we have spent much time in perfecting our various styles of Gold for filling, especially the Plain Foil. Believing that a marked improvement has been made we have concluded to put it in the market under the name of

"STANDARD GOLD."

The fineness of the Gold will be the same in each kind, but the qualities will differ. In regard to foil, the Soft foil will be the basis, and from this the Medium and Cohesive can be obtained by proper annealing, &c. Many, however, will not have the time and facilities for producing these changes as perfectly as the manufacturer; therefore, the three grades of Soft, Medium, and Cohesive will be made.

R. S. WILLIAMS,

SEE OTHER SIDE FOR REPORTS.]

903 BROADWAY. NEW YORK.

The following Reports have been kindly given. Part of these have reference to the "Standard Foil," and part to the other preparations:

29 East 20th St., N. Y., May 15, 1873.

R. S. Williams, Esq.,

DEAR SIR—You ask me how I find your latest article of Gold Foil, that you call "Medium," and I answer that after using it for several months, I find its qualities more uniform and constant than those of any other foil I have used for years. For toughness and softness that does not easily clog, together with a slight cohesiveness that for me is very desirable, I do not know its equal, so that if I were to be confined to any one quality of foil I should prefer this peculiar foil to any that I know of. Trusting that its manufacture may never become one of the "Lost Arts."

I am, yours respectfully, E. A. BOGUE.

---

10 West 11th St., New York, May 16, 1873.

Mr. R. S. Williams,

DEAR SIR—Allow me to congratulate you on your success in bringing out so fine working foil. It is tough, soft, and leaves a fine surface. It is just what we have all been waiting for.

Respectfully yours, A. L. NORTHROP.

---

28 East 13th St., New York, May 15, 1873.

A constant and long-continued use of the preparations of Gold made by Mr. R. S. Williams, enables me to testify with a good degree of confidence to their superior excellence. It is sufficient, perhaps, to say that I rarely use any other. W. A. BRONSON.

---

111 Madison Ave., N. Y., May 6, 1873.

Mr. Williams,

DEAR SIR—Please send to-day, if possible, the usual quantity of "Standard Gold," No. 5. If you can continue to bring this out as uniformly good as all that you have sent for some time past, it will leave nothing to be desired. There is a softness about it that is nearer like tin-foil than any gold I have tried. Also send me a "set" of boxes of Cylinders. You see that I use them as much as ever.

Yours truly, S. G. PERRY.

New York, May 16, 1873.

Having been using for the last few months Mr. R. S. Williams' "Standard Foil," it affords me pleasure to testify to its sterling qualities. As a soft foil, I have never used its equal, possessing, as it does, in an eminent degree, exceeding toughness; with the slightest annealing it becomes sufficiently cohesive to answer all requirements for building out, &c., thereby rendering it unnecessary to have but one kind of foil in the case.

C. F. IVES.

---

78 West 12th St., New York, May 15, 1873.

R. S. Williams,

DEAR SIR—Your communication is at hand. You wish to know what I think of your preparations of Gold for filling teeth. As regards your foils they are certainly very excellent, combining those rare qualities, toughness and ductility, especially the soft, or non-adhesive, which you are aware I use the most of. Your Cylinders I have been, since their first introduction, highly pleased with, and the more I use them the better I like them. They are better for me than any *prepared* Gold in the market, they being extremely soft and readily adapted to the walls of the cavity. I am pleased to recommend them to the favorable notice of professional friends.

I am, yours, very truly, FRANK ABBOTT, M. D.

Brooklyn, May 9, 1873.

MY DEAR SIR—It gives me pleasure to say a word in commendation of your Gold Foil. As you are aware, I have used your Soft Foil, No. 4, almost exclusively for the past two years. I have found it uniform, and uniformly good, possessing a silky flexibility, toughness, and obedience to the will of the operator, most gratifying. Annealing develops the cohesive property to my entire satisfaction, while its softness and yielding character are not thereby impaired. I like it.

C. A. MARVIN.

---

222 Tremont St., Boston, Mass.

Mr. R. S. Williams,

DEAR SIR—I have been using your Soft Foil and Cylinders for the past year, and am well pleased with the manner in which they behave under the plugger. The use of the Cylinders to commence the filling, enables me to complete my operations in much less time than formerly.

Truly yours, THOS. B. HITCHCOCK, D. M. D.

Cleveland, May 7, 1873.

R. S. Williams,

MY DEAR SIR—I have been using for a year your style A Cylinders, and am much pleased with them. They are *ready* for use, which is quite an item if an operator desires to make good use of all his time; and of all the "Thick" Gold that I have tried, I like the No. 30 Crystal Surface Rolled Gold the best. The sample of Soft Foil, No. 5, which was sent in the last order, pleased me much.

Respectfully, C. R. BUTLER.

St. Louis, May 12, 1873.

Mr. R. S Williams,

DEAR SIR—I consider your *Crystal Surface* Gold Foil, Nos. 20, 30, and 60, superior to any I have ever used, and can most cheerfully recommend it for its uniform softness and cohesiveness, qualities, which, from an experience of over two years, I find it to possess in a marked degree.

Very respectfully yours, W. H. EAMES, D. D. S.

St. Louis, May 12, 1873.

Mr. Williams,

DEAR SIR—Your Foils are superior to any of which I have any knowledge.

Respectfully yours, G. A. BOWMAN.

R. S. WILLIAMS, Dental Depot.

SMITH'S

OXYCHLORIDE OF ZINC

Put up in OUNCE PACKAGES, in MOROCCO CASES,

neatly lined with Velvet, containing

FIVE GLASS STOPPERED BOTTLES.

THE CENTER BOTTLE LIQUID.

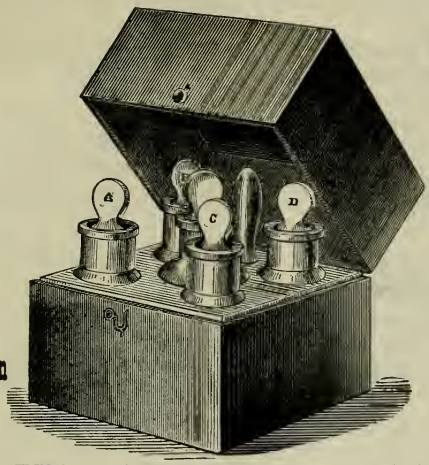
THE POWDER IN FOUR COLORS, IN 1-4 OZ. BOTTLES.

A

White.

B

Light Brown



C

Yellow.

D

Bluish.

☞ With these Colors any desired shade can be obtained.

Each Case contains a Drop Tube. Price per Package, $5.00.

The above is also put up as heretofore, in ¼ oz. Glass Stoppered Bottles, with Drop Tube. Price per package, $1.00.

DIRECTIONS FOR USING THE OXYCHLORIDE OF ZINC.

Clean out the cavity thoroughly, and drop on a glass slab a few drops of the solution; then sprinkle with the powder, sufficient to make a thick paste, and fill the cavity, using precautions for keeping it dry as above stated.

For sale by all the principal dealers in dental materials throughout the United States and Europe. Prepared by

DR. J. H. SMITH,

NEW HAVEN, CONN.

NEW YORK COLLEGE OF DENTISTRY.

EIGHTH ANNUAL SESSION, 1873-74.

FACULTY.

WM. H. ALLEN, Emeritus Professor of the Institutes of Dentistry.

FANEUIL D. WEISSE, M. D., Professor of Regional Anatomy and General Pathology.

FRANK ABBOTT, M.D., Professor of Operative Dentistry and Oral Surgery.

ALEX. W. STEIN, M.D., Professor of Histology, Visceral Anatomy, and Physiology.

F. LE ROY SATTERLEE, M.D., Professor of Chemistry, Materia Medica, and Therapeutics.

C. A. MARVIN, D.D.S., Professor of Mechanical Dentistry.

J. BOND LITTIG, D.D.S., Adjunct Professor of Mechanical Dentistry.

D. W. WILLIAMSON, D.D.S., Demonstrator of Operative Dentistry,

A. RUST CUYLER, D.D.S., Demonstrator of Mechanical Dentistry.

C. F. W. BODECKER, D.D.S., Assistant to the Professor of Chemistry, etc.

Students may matriculate at any time, as the Infirmary is open for regular students of the College to practice in, the entire year.

The regular course of Lectures will commence on Wednesday, October 15th, and continue until the 1st of March. Three hours of each day of the week (except Saturday) will be devoted to lectures, and four hours to *Clinics*, and practice at the Chair, and in the Laboratory, under the direction of the Demonstrators.

The Infirmary consists of two large rooms, each seventy-five feet in length, with an excellent light to operate by, furnished with operating-chairs and tables, all arranged to the best advantage for the more perfect instruction of students. Patients are usually in attendance in great numbers.

Tickets for one year's Instruction, including Course of Lectures, Matriculation, Demonstrators, Diploma Fees, and Practice in the Infirmary the seven and one-half months between the sessions	$150 00
For the Course of Lectures only	100 00
Matriculation (paid but once)	5 00
Diploma Fees	30 00

Board may be obtained for from $4 to $8 per week.

For further information, address

FRANK ABBOTT, M. D., Dean,

78 West Twelfth Street, New York.

SWEET & BIXBY,

68 South Salina Street, Syracuse, N. Y.,

Manufacturers of

ARTIFICIAL TEETH

And Dealers in

DENTAL GOODS.

Teeth, in quantities of Ten Sets or less, sent postpaid by mail, at the following prices, on receipt of cash:

Gum, per Tooth,.....*14 cents.*

Plain, per Tooth,.....*12 cents.*

Discounts from the above prices in proportion to the amount of the order.

We parade no medals and make no boasts, but, in our humble way, invite the attention of Dentists to the following inducement, which, if accepted, will tell the story better than we can:

ONE SAMPLE SET OF 14 TEETH,

Of our New Designs,

With new pins and new materials, will be sent to any Dentist,

ON RECEIPT OF ONE DOLLAR AND HIS ADDRESS.

Union Tooth Company.

New Teeth! New Teeth!

The attention of the Dental Profession is solicited to the New Teeth now being made by the

UNION TOOTH COMPANY, OXFORD, N. Y.

The present manager, ROBERT B. SUTTON, of the manufacturing department, has had over thirty years' experience in the business, and is now assisted by C. H. ECCLESTON, a Dentist of over twenty-four years' active practice, twelve of which he has manufactured teeth, and the present productions of the company will be found to excel in all the requisite features of

SUPERIOR TEETH.

They are offered at the following prices:

GUM TEETH, 14 Cts. each. | PLAIN TEETH, 10 Cts. each.

Teeth with cavities at the same price.

Orders, whether accompanied by remittances or to be sent C.O.D., will receive prompt attention. Agents and druggists and other dealers will be liberally dealt with. Address, UNION TOOTH COMPANY, Oxford, Chenango County, N. Y.

SUTTON & ECCLESTON, Managers.

UNIVERSITY OF ILLINOIS-URBANA
617.606IL C001
TRANSACTIONS AT THE ANNUAL MEETING
9 1873
3 0112 025313443